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SCIENCE

Vol. 103, No. 2680 Friday, May 10, 1946

# The Impact of the War on Medicine

A. N. Richards

*Vice-President, University of Pennsylvania,* and *Chairman, Committee on Medical Research, OSRD*

I AM SPEAKING TONIGHT on the subject of "The Impact of War on Medicine." Impact is defined as collision, and that in turn may imply impetus, damage, or, as in the field of nuclear physics, release of energy. With these several connotations in mind, I shall speak of the impact of the war upon the activities of some of the groups of individuals who constitute the personnel of medicine.

## Medical Students

Before this year ends, the schools of medicine in this country will have graduated some 25,000 physicians whose school training has been compressed into three years of 12 months each instead of the usual four years of 9 months each. About 20,000 of these men, enrolled for military service, received an additional 600 hours of training in military affairs—a burden added to the full medical curriculum—and were subjected to the restrictions of partially regimented living. I have calculated that these figures mean that, as of the present and as of years to come, at least 30 per cent of our physicians who are under 35 years of age, *i.e.* the most energetic fraction of the profession and that to which we look for the urge which drives medicine forward, are men whose training has perforce resulted in greater superficiality in learning, less tenacity of retention of what was learned, and a minimum of that contemplation and discussion from which spring habits of independent thought. How many potential investigators this group contains, and, of these, how many have been permanently diverted from a career of study and teaching is impossible to say, but certainly a serious loss has been guaranteed. Already demands for added and more deliberate training are numerous and are increasing, and they find us lacking in facilities for advanced training which I feel sure we are going to be compelled to supply. Something similar could also be said about teachers. The effects of fatigue and restricted time for reading and research upon enthusiasm and teaching efficiency are so readily understood as to require no labored exposition.

The system of accelerated medical education which was forced upon us and which was not adopted by any other of the countries at war seems to me to have had an impact which may prove to have been calamitous. Its effect may perhaps be partially neutralized if the damage is recognized and if we force ourselves to construct and organize facilities for advanced training not only for the near, but also for the long, future.

## Physicians in the Army

To provide medical service for an army of 8,000,000 men, the peacetime strength of the Army Medical Corps was increased from about 1,200 to 46,000. This increase included 52 general hospital units and 20

***Dr. A. N. Richards will receive the William Guggenheim honor cup*** **this year from the University of Pennsylvania Club of New York City. The cup is awarded each year to an individual who has brought distinction to the University. Dr. Richards played an important part in bringing about the production of penicillin for war needs, and since 1941 has served as chairman of the Committee on Medical Research of the Office of Scientific Research and Development. The award will be made tonight at a dinner at the Club, 106 West 56th Street, New York City.**

**This article was taken from an address delivered at a dinner and symposium entitled "Medicine's Tomorrow," sponsored by New York University College of Medicine on 22 January 1946.**

evacuation hospital units, the medical personnel of which, probably numbering about 2,500, were recruited almost without exception from teaching hospitals associated with medical schools. Your own unit (Bellevue) was the 1st General; ours from the University of Pennsylvania was the 20th.

My acquaintance with the effects of the war upon the men who staffed these units is limited almost entirely to those who went out from the University of Pennsylvania school and hospital. After more than two years service in northeastern India, in a climate of torrid heat and rains which, for the greater part of the year, made personal comfort unobtainable, they came back with morale which put us who had stayed at home to shame and with keen enthusiasm for the job ahead. For the three years of their service they had been practicing socialized medicine in the strictest sense—group practice—and now that they are civilians again they want nothing quite so much as a reorganization of affairs at home of such a sort as to minimize the ineffectiveness of individual competitive practice, and by group and institutional organization combinations to obtain the opportunities which shall result in better care for patients and more time for the advancement of their own knowledge. If many of those 72 units had similar experience, the impact of that experience on the trend of medical practice can scarcely fail to be significant.

### Medical Investigators

With respect to medicine, the first of our permanent civilian scientific organizations to be asked to participate with our armed services in their preparations for war was, I believe, the Division of Medical Sciences of the National Research Council. One of the specified functions of that body, established by President Wilson in 1918, was to bring about cooperation of civilian investigators with the scientific and technical services of the War and Navy Departments. Accordingly, early in 1940, Dr. Weed, chairman of that Division, offered its services to the Surgeons General of the Army and Navy, and in May of 1940 at their request two committees, advisory in matters of military medicine, were appointed.

The usefulness of the discussions which then began between medical officers of the services and civilian experts was so quickly apparent that additional committees and subcommittees were formed, their several assignments corresponding to the breakdown of the problems with which the Services expected to be confronted. By July of 1941 there were 7 main and 32 subcommittees, numbering more than 350 persons. As a result of these discussions the Services were provided with summaries of contemporary medical information applicable to military problems, aid in revisions of the Army Medical Manual, recommendat concerning organization, equipment, methods of vention and treatment of injury and disease. course, questions were raised which could not be swered with existing knowledge, and that in t brought about plans for investigations.

The NRC is not strictly a governmental age and does not receive funds from Congress. Late 1940 a total of less than $90,000 was available research from funds supplied by the Federal Secur Agency, the American College of Physicians, and Carnegie Corporation—a pitifully small amount contrast with the tasks envisaged.

At about the time when Dr. Weed was offer the services of the NRC to the Surgeons General, governmental civilian agency for research in inst mentalities of warfare was being created by Execut Order of the President. This was known as t National Defense Research Committee and was und the chairmanship of Vannevar Bush. Under t Committee were mobilized the country's chemist physicists, and engineers. Their efforts, now regard as having been decisively responsible for such dev opments as radar, proximity fuses, amphibious v hicles, and the atomic bomb, were at once so impr sive that President Roosevelt in 1941 ordered t formation of a committee with similar responsibiliti in the field of medical science—the Committee Medical Research. By the same order he created t Office of Scientific Research and Development, with which the two Committees were to operate under t direction of Dr. Bush. The Office and its committe were to be financed from Congressional appropri tions.

At its first meeting in July 1941, the CMR arrange an alliance with the NRC groups and thus secure the advantages of their previously acquired familiar ity with military medical problems. Dr. Weed, a appointed member of the CMR, was made its vic chairman, and the Council committees and subcom mittees agreed to act in an advisory capacity to th CMR. OSRD funds were assigned to the National Academy of Sciences by contract, under the terms of which the Council was to be reimbursed for the expenses of committee meetings, conferences of investigators, and preparation of reports.

In the four and one-half years which have since elapsed, the Committee has held 122 meetings, or an average of more than two per month; the meetings of the advisory committees and conferences of investigators have come to number nearly 1,000.

The work of the CMR has been done largely through contracts with universities, medical schools, hospitals, and research institutes. Almost 600 such contracts have been executed: in rounded figures,

50 with universities, 50 with hospitals, 40 with research institutes, 20 with other government agencies, and 20 with commercial firms. The expense has been approximately $24,000,000—about enough to finance the cost to us of the war for a space of perhaps three and one-half hours. The number of investigators involved in these studies is nearly 5,500: 1,500 doctors of medicine or philosophy and 4,000 technical assistants.

The list of subjects on which investigation was demanded is long. One purpose was common to all, namely, to increase the applicability of what was already known to the better protection of fighting men against injuries, disease, exposure, and fatigue, whether in camps, transports, naval vessels, or in the field—in the North African desert, in tropical jungles, or in the Arctic. Among the many problems with which we were concerned were: protection against influenza, pneumonia, dysenteries, and gas gangrene; prophylaxis and treatment of streptococcus infections and of venereal disease; discovery and use of a substitute for quinine (taken from us by the Japanese) in the treatment of malaria, the number one menace of the tropics; acceleration of convalescence; prevention and control of bacterial infections of wounds and burns; avoidance and treatment of shock; methods of restoring blood volume after hemorrhage and preservation of whole blood for transport from this country to combat theaters; nerve regeneration and nerve repair following nerve injury; protection of aviators against lack of oxygen, cold, and "blackout"; means for better adaptation of men to extremes of heat, cold, and humidity; protection against poison gases; insecticides and repellents with which to avoid malaria, typhus, and the other insect-borne tropical diseases.

Some of these investigations failed to yield results directly applicable to military medicine, but I am sure that every one has given information which will find a useful place in the advance of medical knowledge; some, however, have been so brilliantly successful in terms of lives saved, lessened disabilities, and increased combat effectiveness that they have justified the entire effort. Furthermore, physicians of the future will have been supplied with effective means, never before available, for their war against disease.

Let me give examples of definite accomplishments:

(1) Means have been found for identifying the two recognizable forms of influenza, and new vaccines have been created which lessen the incidence of this disease. A similar statement can be made concerning typhus and cholera.

(2) A pure polysaccharide, produced from the capsules of pneumococci, was proved to be completely protective against lobar pneumonia.

(3) By experimental studies of the chemotherapy of malaria, the safety of routine dosage with a hitherto little-known drug, atabrin, was assured; from knowledge gained concerning its behavior in the body, our pharmacologists were able to show how often and in what dosage it must be given; and on the basis of this information was built the atabrin discipline of our troops which reduced malaria from its position as a menace more dangerous than Japanese bullets to one of relative inconsequence.

In the same field—malaria—thousands of products from scores of chemical laboratories have been examined by our pharmacologists and clinicians, with the result that we are confident that we now possess at least one new drug, far more effective than anything hitherto known as a suppressive of malaria.

(4) A group of chemists whose peacetime studies had been concerned with the characteristics of proteins, applied their knowledge to the separation of therapeutically useful constituents of human blood plasma. Pure serum albumin in concentrated solutions of small bulk proved to be as effective against shock and also simplified problems connected with shipping space for packages of dried whole plasma. The same chemists succeeded in separating the clotting elements of blood and gave them to the surgeons in the form of pledgets which were wonderfully effective in stopping obstinate hemorrhage. They separated, as a dry powder, the proteins of blood which give us immunity against infections and found this to be effective as a preventive against two virus diseases which have disabled numbers of our troops—measles and infectious jaundice.

(5) The compound now so widely known as DDT was made in a German laboratory 70 years ago. A sample was brought to us from Switzerland in 1942, along with the information that it was extraordinarily effective in killing potato bugs and certain flies. From this beginning American science and industry developed the means by which the typhus epidemic in Naples was aborted and by which future epidemics of that disease can certainly be controlled—by which, too, the efficacy of sanitation against mosquito and other insect-borne diseases will be vastly increased.

(6) With regard to penicillin, Fleming discovered its existence, gave it its name, and predicted its usefulness in 1929. Florey succeeded in purifying a small amount—enough with which to confirm Fleming's prediction. Stimulated by Florey and encouraged by our Government, our biologists learned how to increase its production and our chemists, how further to purify it. Our physicians defined its therapeutic power and its limitations. Our manufacturers, against enormous difficulties, transformed a difficult laboratory experiment into a great industry. In less

than three years they gave to our troops, and to those of our British allies, huge supplies of this tremendous weapon against infections. Thus, a permanent asset to the health and welfare of the human race was created.

These and many others are concrete, tangible additions to the resources of physician and surgeon which have resulted from energy liberated by the impact of war upon American investigators; their continuing and permanent usefulness is certain.

Other less tangible but no less real results can be identified. Some of them are: (1) Recognition by Government, by the public, and by scientists themselves of the value of science as a national asset; (2) increased recognition—indeed, concrete demonstration—of the essential identity of the spirit of scientific inquiry wherever it is to be found throughout the world. The friendships which have been engendered by the collaborations of our own scientists among themselves and by our scientists with those of Canada, Britain, and Australia represent, to my mind, a priceless acquisition; (3) recognition that regimentation in any restrictive sense is abhorrent and that such financial support to science as may be conditioned upon it is unacceptable and adverse to its interests; (4) realization of the advantages which are to be gained from frequent conferences of workers with free exchange of ideas and experience; (5) recognition that scientific industry, unrelieved by leisure, can defeat itself; and (6) recognition—I hope by all of us—of the part played by fundamental, in contrast with applied, research in the advance of science.

The implications of these categories of gains are sufficiently obvious. I should, however, like to s something more concerning fundamental *vs.* appli research.

I think it safe to say that most, if not all, of t useful results which have come out of medical scie tific war efforts are in no real sense discoveries; th are rather the developments of discoveries made lon before the war in laboratories where knowledge is pu sued for its own sake with little regard for utilit Given our scientific population, stirred by the n tional danger and an intense desire to take part the war effort; given opportunities which enable them to understand, define, and discuss the problem which needed solution; given also the money wit which to obtain equipment and help for their exper mentation—a broadly accurate prediction could hav been made of the usefulness of the outcome of th national effort which I have been discussing. Indee such a prediction actually initiated the effort.

To me it seems utterly improbable that the factor just named, in any combination, could have produce during the period of the war the discoveries fro which these practical results have emerged. Thos were the fruits of informed and ardent curiosity to gether with freedom and means with which it coul be satisfied. The only leadership required is th within the mind of the investigator himself. To pr vide for the future advance of science and the tr discoveries which will inevitably accrue, it is on necessary that the present generation of productiv scientists be given freedom from intellectual restri tions, optimal facilities, and discriminatingly selecte disciples.

# Anatomy and the Concept of Analogy

**Ernst Scharrer**

*Western Reserve University School of Medicine*

OVER A HUNDRED YEARS AGO Richard Owen formulated two fundamental concepts, homology and analogy. A homologue is "the same organ in different animals under every variety of form and function" (*3*). For instance, the foreleg of a mammal, the wing of a bird, and the pectoral fin of a fish are homologous. An analogue is "a part or organ in one animal which has the same function as another part in a different animal" (*3*). Thus, the gills of fishes and the gills of crustaceans are analogous. These two concepts appear of equal importance, and one might expect that both are by now well documented. Actually, however, comparative anatomy has practically identified itself with the exclusive study of homology. Analogy is considered by many anatomists as a subordinate concept the study of which does not come within the province of comparative anatomy (*7*).

It is true that the concept of homology has provided the basis on which definite morphological and phylogenetic relationships could be established. Whatever work there is still to be done in this field must be oriented along these lines, and the great historical significance of the idea of homology remains undisputed. However, it is also true that the purely morphological and phylogenetic approach to problems of structure has reached a static condition. As in the case of other useful concepts, the heuristic value of homology is not without its limits and has become nearly exhausted. Efforts to develop further the idea

of homology have not stimulated anatomical research to any noticeable degree (*6, 10*); indeed, the idea has largely disintegrated when faced with the results of experimental morphology (*9*). Some of the defenders of the primacy of homology corroborated rather than refuted this fact (*8*).

In view of the sterility of an anatomy interested only in the historical aspects of structure, it would seem worth while to examine the potentialities inherent in the study of that neglected concept, analogy, i.e. the functional correspondence of organs.

The study of analogy offers a wide perspective, inasmuch as it permits the analysis of structures as they represent solutions of functional problems. Böker (*2*) has demonstrated how fruitful this approach is, although he restricted his "Biological Anatomy" to the vertebrates. Actually, the field is much larger, for without the dominating presence of the concept of homology the barrier between vertebrates and invertebrates disappears. This barrier has been magnified out of proportion to its true significance and has rendered anatomy no service other than to limit the study of many problems to the vertebrates. But in spite of their great variety, animals with and without vertebrae are faced with basically similar functional problems—orientation in space, conservation of water, disposal of waste materials, to name only a few. The interest lies in discovering how many different fundamental structural solutions of the same problem have been "invented" by different organisms. The broader the basis on which such inquiries are conducted, the more valuable will be the insight gained with respect to the functional significance of anatomical structures.

The great promise of a reorientation of comparative anatomy along such lines is not hypothetical; it can easily be estimated by glancing through Meisenheimer's (*5*) monumental study of reproduction, Krogh's (*4*) analysis of the mechanisms of respiration, or Baldwin's (*1*) delightful essays on comparative biochemistry. It is difficult to see why this type of investigation should not come within the province of comparative anatomy, even if it is in one way or another based on the concept of analogy. The value of concepts is measured by their influence on research. By this standard the concept of analogy will probably not forever hold the subordinate place which is still assigned to it in comparative anatomy.

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# Universal Military Service in Peacetime

## A Statement by the American Mathematical Society and the Mathematical Association of America

THE WAR POLICY COMMITTEE of the two mathematical organizations was formed to study the many questions of professional and scientific policy arising out of the war. No subject has been of greater interest or more vital concern to the Committee than the relations between scientific effectiveness, on the one hand, and the military requirements of the Nation, on the other. A most important aspect of this subject is treated in the report on "Universal Military Service in Peacetime," recently made public. This report is directed in the main at points upon which mathematicians, as such, are particularly qualified to express informed opinions. Whatever view may ultimately prevail—and it should be emphasized that there are many citizens, mathematicians included, who doubt the wisdom of introducing

***In July 1945 a report on this topic was prepared*** **by a subcommittee of the War Policy Committee which consisted of W. L. Hart (Chairman), Saunders MacLane, and C. B. Morrey, Jr. The report, which was approved by the War Policy Committee, the Council of the American Mathematical Society, and the Board of Governors of the Mathematical Association of America, was published in full in the *Bulletin* of the American Mathematical Society. Chairman Marshall H. Stone, of the War Policy Committee, has furnished this summary statement.**

universal, compulsory military training in time of peace—it is clearly of the first importance that no program detrimental to the scientific and technological vigor of the Nation should be adopted. The report deals frankly and in detail with this vital segment of the problem now before Congress. In offering the recommendations of the report as a professional contribution to the current discussion, the War Policy Committee hopes to render a modest public service within the natural sphere of its activity.

## Introduction

Congress is currently considering legislation to establish universal military service in peacetime. It is the purpose of this report to examine the implications of such legislation for those phases of our national life about which mathematicians may speak with special knowledge. It is natural, however, that some of the statements made should reflect a broad educational concern rather than a strictly professional one.

## General Recommendations

This report does not deal directly with the basic question: "Should the United States have universal military training in peacetime?" We believe, however, that this question should be decided only in the light of a thorough study by a Presidential commission representing not only the armed services but also other important national activities, including science, industry, and technology.

## Specific Recommendations

The report concerns itself chiefly with the equally important question: "If Congress is to pass a universal military service act, what provisions should be included in order that the greatest benefit should be obtained for the Nation as a whole and for the young men who will perform the service?" From our recent experiences with the development of new weapons and tactics, it is clear that science is a fundamental factor in the military power of the Nation; and that, as a result, long-range military planning requires that young men be encouraged to prepare themselves in basic scientific and mathematical knowledge and to acquaint themselves with the ways in which this knowledge can be applied in time of war or national emergency. Furthermore, it is equally important that the peacetime military program should not interfere with plans to overcome the present dangerous shortage of scientists and technologists and to provide for a continuous generous supply in such essential categories of trained citizens in the future. Our democratic principles bring out clearly the unwisdom of granting individual exemptions as a means of safeguarding the development of science and technology. It is therefore recommended at the outset that:

(1) No outright exemptions from universal military service should be requested.

The appropriate way to harmonize military training with our scientific and technological needs lies rather in the direction of recognizing frankly that military training includes not only the usual routine military activities but also various other highly technical forms of training equally essential for the development of military strength. In particular, a program of military training could, with great advantage, include appropriate advanced types of service in which the special aptitudes of the small but important group with a bent for mathematics, the physical sciences, or engineering are employed and developed. Accordingly, the next recommendation reads:

(2) The required military service should be highly differentiated in accordance with the aptitudes and training of the young men involved, with emphasis on exceptional differentiation for those with the greatest technical abilities.

In order that young men with the prerequisite aptitudes should have opportunities to prepare themselves for such differentiated service, the possibility of deferments must be considered. More important still is the problem of preventing the atrophy or diversion of the scientific talents of any appreciable proportion of the Nation's youth on account of ill-timed interruptions in scientific training occasioned by the military program. This problem, too, would be met most easily and directly by a policy of deferments. It has been estimated that the small but significant body of scientists and engineers must be recruited annually from a group of high school graduates including around 20,000 boys of high mathematical and scientific aptitude. In order to safeguard the training and development of these essential young men, it is therefore recommended that:

(3) A system for deferring the term of military service should be instituted so that gifted young men might prepare themselves for advanced varieties of differentiated service before entering the armed forces.

(4) The possibilities for technical varieties of differentiated service should be canvassed by a joint civilian and military board. The resulting training programs with the corresponding academic prerequisites should be well advertised among high school boys, their parents, and the teachers and administrators in the secondary field.

Indeed, a deferment policy so liberal as to permit continued postponement of the term of military service until completion of work for the Ph.D. would

entirely justifiable, it is thought, in the case of remely gifted young men, who could then perform r service in the various laboratories, research divi-s, arsenals, and other technical agencies of the ed forces. In addition to a wise policy of defer-t, the encouragement and development of youthful ntific talent under the circumstances which would produced by universal compulsory military train-make necessary a policy of strengthening scien-training both before and during the term of ice. To this end, added efforts should be made he field of secondary education to teach the better dents as much mathematics and physical science possible; and young men in military service should given every encouragement, including the payment by government of the necessary fees, to extend their formal education by pursuing correspondence courses, including courses at college level. The report therefore recommends that:

(5) If universal military service is adopted, in the field of secondary education particular attention should be paid to increasing the efficiency and quantity of instruction given in mathematics and physical science to the students of better than average ability.

(6) The armed forces should encourage young men to continue their education during military service by taking correspondence work through regular school channels, and should pay the costs of such study if a man carries it through diligently.

# *Technical Papers*

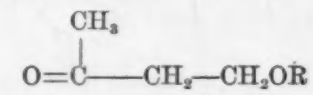
## nthesis of Biologically Active itamin A Substances[1]

NICHOLAS A. MILAS[2]

*Massachusetts Institute of Technology*

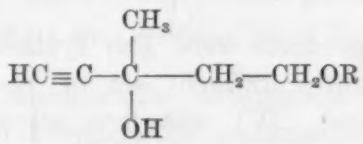
The structure of vitamin A was definitely estab-ed from degradation and other experiments as far k as 1931 by Karrer (*4*) and was later confirmed Heilbron (*2*) and others. On the basis of this owledge, several synthetic methods, claiming the thesis of vitamin A itself and some of its deriva-es, have been published in various countries during last decade. Of these, only one—that published Germany in 1937 by Kuhn and Morris (*6*)—claims have produced a biologically active product. Sub-uent attempts to reproduce this synthesis in other ntries (*5*) as well as in Germany (*8*) have been irely unsuccessful.

The German method was one of the first we inves-ated, but our failure to obtain one of the key rmediates, β-ionylidene acetaldehyde, forced us abandon this method early in 1940. Since then, have investigated several alternative syntheses ). In one of these syntheses, which led to biologi-ly active vitamin A substances, the aldehyde (I), originally prepared by Ishikawa and Matsuura (*3*) from β-ionone and ethyl chloroacetate, was condensed with lithium acetylide in liquid ammonia at –60 to –70° C. to give the acetylene carbinol (II) in about 65 to 70 per cent yields. A condensation of this product, via the Grignard reaction, with the ketone (III), in which R may be either an alkyl or an acyl group



(III)

depending upon whether an ether or an ester of vitamin A is wanted, produced the acetylene glycol (IV) in about 70 to 80 per cent yields. The acetylene glycol ethers have also been synthesized in higher yields by condensing, again via the Grignard reaction, 3-methyl 3-hydroxy 5-alkoxy pentyne-1 (V) with the aldehyde (I). Unfortunately, the corresponding acetylene glycol esters cannot be obtained easily by this reaction. In the next step of the synthesis, the

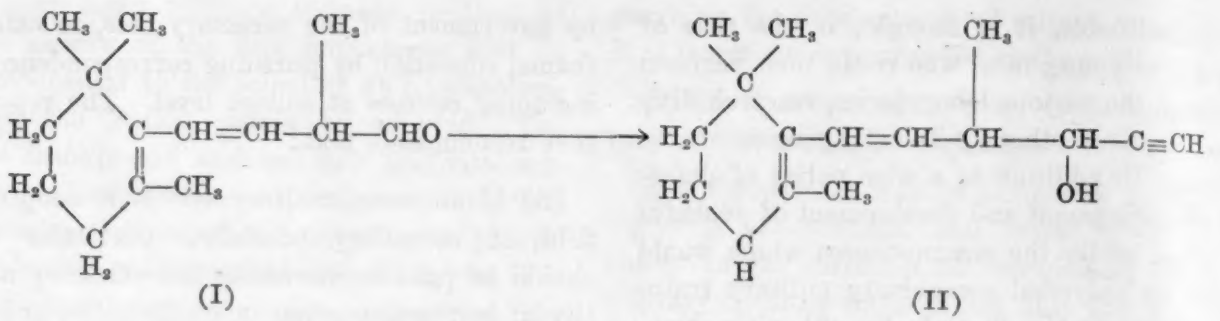


(V)

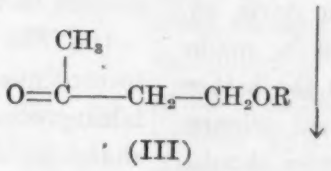
acetylene glycol was dehydrated, using *p*-toluene sulfonic acid as the dehydrating agent, to produce the polyvinyl acetylene (VI), which, when selectively hydrogenated, yielded biologically active ethers or esters of vitamin A (VII), depending upon whether R was an alkyl or an acyl group.

[1] Presented in part before the North Jersey Section of the erican Chemical Society, 9 April 1945; the AAAS-Gib-Island Conferences, 23 July 1945; and in a Vitamin A posium sponsored by the Northeastern Section of the erican Chemical Society, 10 January 1946.

[2] The author takes this opportunity to gratefully acknowl-ge the assistance of (Miss) M. A. Campbell, R. O. Edgerton, rs.) J. Gladding, F. X. Grossi, J. N. Ingraham, S. W. Lee, rs.) A. R. Lowry, N. S. MacDonald, (Miss) S. Z. Paul, rs.) R. Pitt, J. T. Plati, E. Sakal, (Miss) Z. Weiss, H. C. hlers, and H. F. Wright.



(I) (II)



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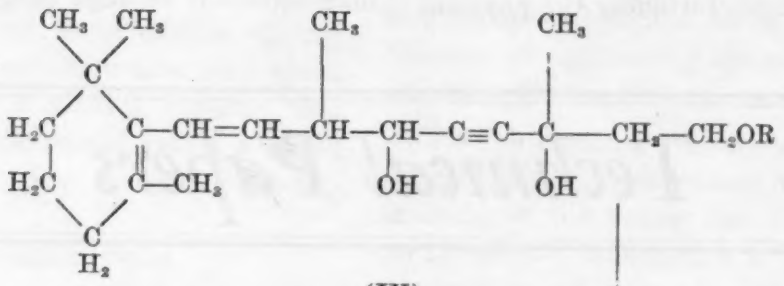

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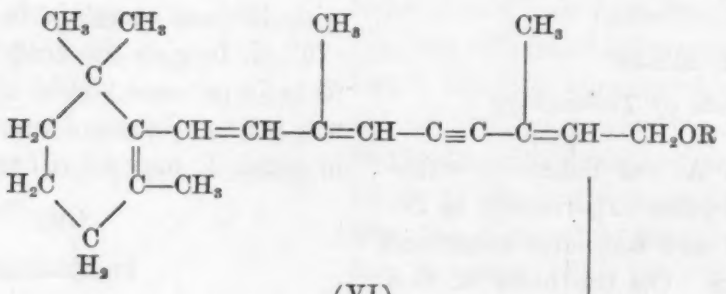

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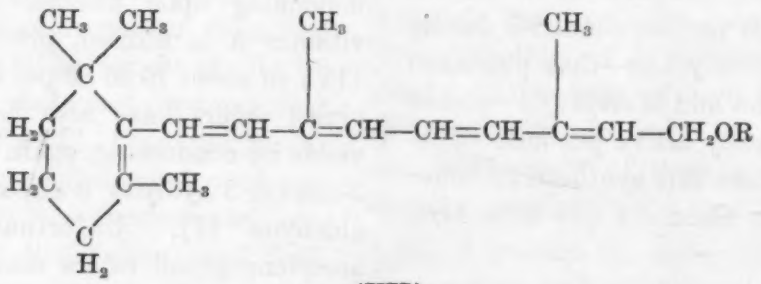
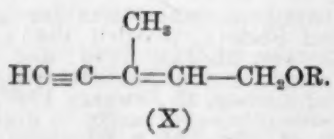


(VII)

The final products were also synthesized by following a slightly different set of reactions. The acetylene glycol (IV) was first selectively hydrogenated to an olefinic glycol (VIII), which was then converted to the dichloride (IX), and the latter dehydrochlorinated with alcoholic potash to the corresponding ethers of vitamin A when R was an alkyl group and to the vitamin A alcohol itself when R was an acyl group.

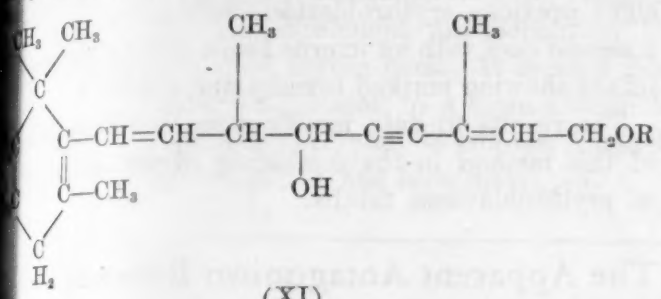
In order to obtain additional data on the synthetic ethers of vitamin A and to avoid going through the acetylene glycol (IV), a third, slightly differe method was developed. The acetylene carbinol ( was first dehydrated to produce 3-methyl 5-alko vinyl acetylene (X),



(X)

When this was condensed, via the Grignard reactio with the aldehyde (I), the acetylene carbinol (X

s produced in very good yields. This carbinol was ily dehydrated to the polyvinyl acetylene (VI),



(XI)

m which the vitamin A ethers were obtained by ective hydrogenation. The acetylene carbinol (XI) s also been selectively hydrogenated to the corre- onding polyene carbinol (XII), which was advan- eously dehydrated to give good yields of vitamin A hers.

The final products produced by the three synthetic ntes outlined above are identical whenever R is the me. Ultimate analysis, unsaturation, and molecular ight determinations agreed well with the expected lues for the structural formula (VI). The absorp- n spectrum in the ultra-violet has a well-defined ximum similar to that observed for the correspond- g natural vitamin A substances, except that it is ghtly displaced towards the ultraviolet region by out 30 to 50 A. The synthetic ethers of vitamin give a purplish blue color with antimony tri- loride which exhibits both the 6,200-A. and the 500-A. bands characteristic of natural vitamin A. he vitamin A esters and the alcohol itself give a deep ue color exhibiting the same bands.

Biologically, all the synthetic products which are epresented by the final structure (VI) have been und active by Prof. Harris, of the Nutritional Labo- tories of this Institute. Furthermore, the biologi- l effect on rats has been found to be identical with at produced by cod-liver oil. The potency, however, as much lower than that generally accepted for the rest sample of natural crystalline vitamin A 3,500,000 U.S.P. vitamin A units per gram). For he synthetic vitamin A methyl ether, for example, rof. Harris reported indications of activity in the der of 500,000 to 1,000,000 U.S.P. vitamin A units r gram and reproducible activity of the order of 0,000 to 100,000 U.S.P. units per gram. Several her laboratories have tested our synthetic products nd confirmed, within certain limits of variation, the wer potencies reported by Prof. Harris. Although he potency of the synthetic products is much lower han that of the purest natural crystalline vitamin A, he biological activity cannot be disputed and, if com- ared to commercial products, it is of the order of to 100 times that of ordinary cod-liver oil, one of he chief sources of vitamin A.

If the biological potency of the synthetic products is much lower than that of the corresponding natural products, one can raise the question whether they are identical. We have devoted a considerable amount of our time in an attempt to answer this question. Our most recent results seem to indicate that the synthetic products are mixtures of stereoisomers of the *cis-* and *trans-* type, exceedingly difficult to separate and some of which are probably completely devoid of biological activity. This is not surprising, for even the natural vitamin A, when first isolated by Karrer (1931), presumably in a chemically "pure" form, had a considerably lower potency than the crystalline vitamin A recently prepared by Baxter and Robson (*1*). Was Karrer's sample a mixture of stereoisomeric forms, some of which were biologically inactive? This question cannot be answered until the stereochemical configuration of vitamin A is known. Merely speculating from analogies with certain carotenoids may lead to a false conclusion. Some organic chemists are unwilling to admit that *cis-* and *trans-*isomerism is even present in molecules which have more than three double bonds in conjugation. Work along these lines is exceedingly difficult and time-consuming, but it is quite essential because of its connection to the important problem of specificity of vitamin A.

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## Treatment of Severe Erythroblastosis by Simultaneous Removal and Replacement of the Blood of the Newborn Infant[1]


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Although considerable information has been accumulated concerning the mechanisms involved in the causation of erythroblastosis fetalis, the established treatment by repeated transfusions of Rh–blood has thus far not been entirely successful. Many babies with erythroblastosis have died of the disease, though no evidence of severe anemia existed. A fac-

[1] Preliminary report from the Laboratories of the Queens General Hospital, Jamaica, Long Island, and from the Department of Hematology, Jewish Memorial Hospital, New York City.

tor of toxemia, possibly arising from the stromal substance of the lysed red blood cells, undoubtedly plays an important part in the fatal outcome in these cases. The manifestations of such a toxemia are found in kernicterus and in the evidences of kidney and liver damage that may exist. It was felt that the mere administration of Rh– blood did not meet the problem in all cases. It did seem desirable to remove the known Rh+ blood of the infant and to replace it with Rh– blood. Such a procedure would either minimize or entirely prevent the action of the hemolytic end products upon the liver, kidneys, and brain ganglia.

A technique has been evolved to carry out this purpose to a considerable degree, without subjecting the child to the hazard of shock due to exsanguination. This is accomplished by the simultaneous withdrawal of the Rh+ blood from the sagittal sinus and the administration of Rh– blood through a cannulated vein.

It can be shown mathematically that if a continuous transfusion and withdrawal is carried out for 60 minutes, if the mixing is considered the equivalent of instantaneous, and if the baby's blood volume is approximately 250 cc., only 36.7 per cent of the original blood will remain. To test this hypothesis, we duplicated the conditions by the use of an aspirator bottle containing 250 cc. of tenth normal HCl with a pipette for the constant admission of distilled water, at a rate which was equal to the loss of the HCl in the aspirator bottle, into a measuring cylinder. A stirrer was kept within the aspirator bottle. When 250 cc. of fluid from the aspirator bottle was collected in the cylinder, a sample of the liquid remaining in the aspirator bottle was titrated and showed .0367 normal HCl.

A variation of this procedure, whereby 50 cc. of blood are removed from the baby and then an equivalent amount administered in alternation, can be shown arithmetically to permit of an exchange that leaves behind 80 cc. of the original 250 cc. Inasmuch as the child is given approximately 100 cc. of Rh– blood over and above that withdrawn, the dilution factor permits of a reduction of the original Rh+ blood to 25 per cent of the original volume. The typing of the blood cells removed at the start and at the end of the exchange confirms the fact that only 25 per cent of the original Rh+ cells remain after such a procedure.

On the basis of the above, this technique has been carried out on three separate infants since May 1945, with immediate improvement in their conditions and eventual recovery without further therapy. It will be understood that, because of the dramatic nature of the procedure, only infants who were most severely ill with erythroblastosis were submitted to this rou... These included a twelfth pregnancy of a mother w... eight previous erythroblastotic babies and stillbir... a second case with an icterus index of 625, and a t... infant showing marked toxicity and spasm.

The results to date justify a more widespread ... of this method in the combating of the severe co... of erythroblastosis fetalis.

## The Apparent Antagonism Between Vitamin A and Carotenoids in the Fowl

MAX RUBIN and H. R. BIRD

*Bureau of Animal Industry, Beltsville Research Center, Beltsville, Maryland*

Hammond and Harshaw (*2*), working at the Bel... ville Research Center, showed that there was some ... terial in fortified cod-liver oil which interfered w... the deposition of xanthophyll in the shanks and s... of chicks. Mattson and Deuel (*5*) reported that th... was interference in the carotenoid metabolism of gro...

TABLE 1

| Supplement to basal diet | Approx. I.U. of vitamin A per 100 grams of diet | Av. pigment score | Range score |
|---|---|---|---|
| *First Experiment* | | | |
| (1) None | ..... | 16.0 | 15.0-1... |
| (2) 0.045 per cent vitamin A concentrate | 9,000 | 6.4 | 3.0-1... |
| (3) 5.4 mg. crystalline carotene per 100 grams of diet | 9,000 | 15.2 | 14.0-1... |
| (4) 3.0 per cent vitamin A and D oil No. 1 | 9,000 | 7.0 | 4.0-1... |
| (5) 0.140 per cent shark-liver oil | 3,000 | 12.2 | 7.0-1... |
| (6) 3.0 per cent vitamin A and D oil No. 2 | 3,000 | 13.4 | 8.0-1... |
| (7) 3.0 per cent irradiated* A and D oil No. 2 | ..... | 14.2 | 10.0-1... |
| (8) 3.0 per cent shark-liver oil | 60,000 | 4.6 | 4.0-... |
| *Second Experiment* | | | |
| (1) None | ..... | 15.7 | 15.0-17... |
| (2) 0.4 per cent ethyl laurate | ..... | 16.4 | 16.0-17... |
| (3) 0.4 per cent ethyl laurate and 3.51 mg. crystalline vitamin A alcohol per 100 grams | 9,000 | 11.4 | 6.0-1... |
| (4) 0.053 per cent vitamin A concentrate | 9,000 | 11.0 | 3.0-1... |
| (5) 0.492 per cent shark-liver oil | 9,000 | 10.2 | 4.0-17... |

* Irradiated with ultraviolet light for 16 hours to destr... vitamin A.

ing chickens when they were given daily doses ... shark-liver oil to supply 9,300 I.U. of vitamin ... Deuel, *et al.* (*1*) fed 0.01 per cent to 2.42 per cent ... shark-liver oil to hens to supply from 1,000 to 200,0... I.U. of vitamin A per pound of feed. There was ... progressively decreasing quantity of pigment in th...

egg yolks as the shark-oil content of the diet was increased. These workers concluded that the vitamin A interfered with the carotenoid metabolism in both growing chickens and laying hens. It seemed desirable to subject this conclusion to a more critical test by feeding, respectively, crystalline vitamin A and fish oil in which the vitamin A had been destroyed.

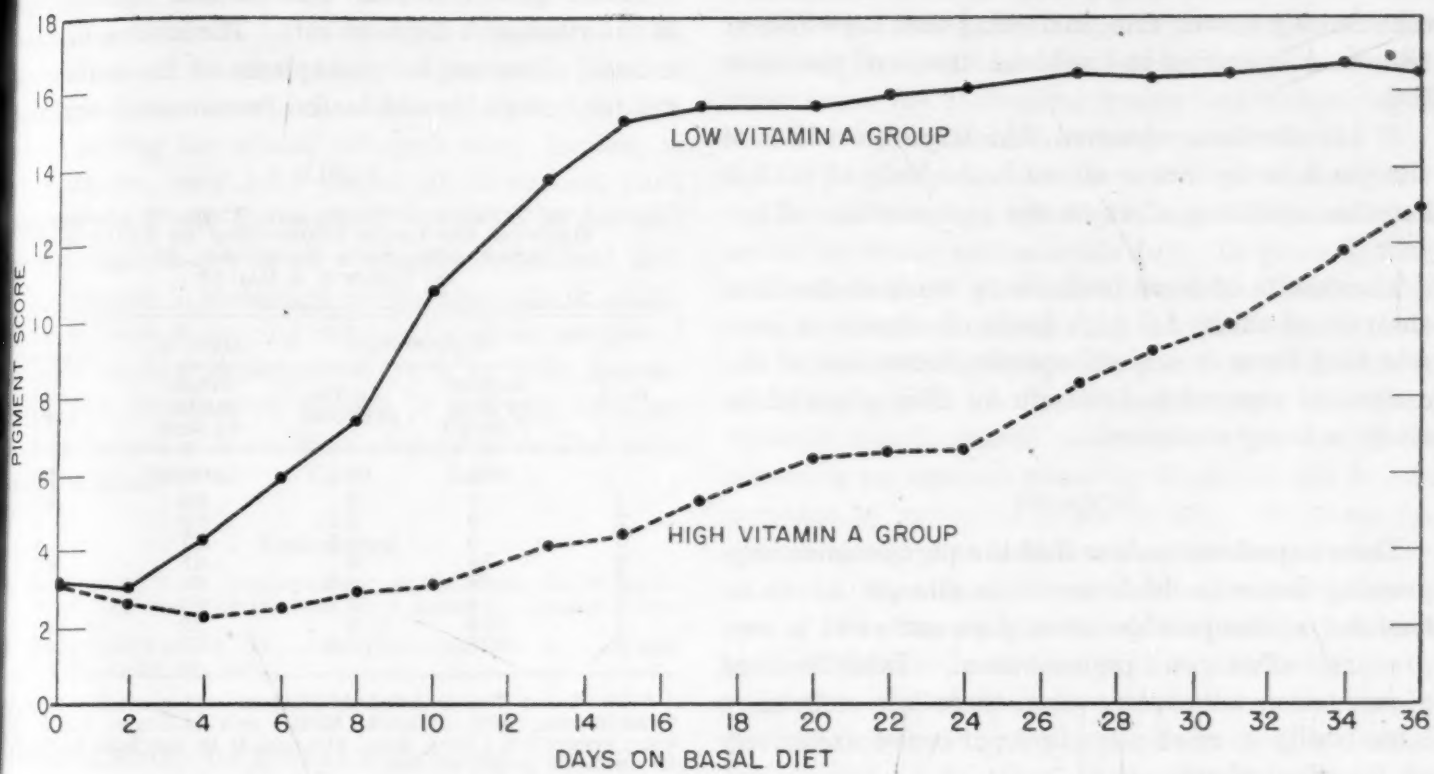


FIG. 1

Hammond and Harshaw suppressed pigmentation by feeding 3 per cent of fortified cod-liver oil which contributed 9,000 I.U. of vitamin A per 100 grams of diet. Therefore, two experiments were planned in which various supplements were fed to supply this level of vitamin A. These experiments are summarized in Table 1. The basal diet was Diet C of Hammond and Harshaw, containing 40 per cent yellow corn, 10 per cent corn gluten meal, and 3 per cent alfalfa leaf meal as sources of carotenoid pigments. The experimental diets were fed to groups of 25 chickens during the first six weeks of life, at the end of which time the degree of shank pigmentation was determined by matching the color of the shanks with the Heiman-Carver (*3*) color rotor.

In the first experiment, all groups fed 9,000 or more units of vitamin A per 100 grams of diet showed considerably less pigmentation than the control, except for the group fed carotene. The vitamin A concentrate fed to Group 2 was at least as effective as the vitamin A and D oil fed to Group 4. Compared to the effect of these two supplements the effect of the irradiated oil, which was free of vitamin A according to the antimony trichloride test, was very slight.

In the second experiment the average pigment scores of the chicks fed vitamin A supplements were not as low as in the previous test. However, it is evident that crystalline vitamin A alcohol suppressed pigmentation as effectively as did the vitamin A of the concentrate or of shark-liver oil.

Mattson and Deuel suggested that a high intake of vitamin A might lead to development of a non-specific enzyme system capable of destroying not only vitamin A but also carotene and carotenoids. However, Hickman (*4*) has found that "*in vitro* experiments show that vitamin A is a specific pro-oxidant for beta-carotene, lycopene and probably zeaxanthin."

It was of interest to determine whether this pro-oxidant effect is largely confined to the intestinal tract in chickens or whether bodily stores of vitamin A are capable of exerting the same effect in the blood stream or tissues.

During the first six weeks of life chicks were fed diets which were deficient in carotenoid pigment. The diet of the first group was supplemented with enough vitamin A to maintain good growth. The second group was supplied with 100,000 U.S.P. units of vitamin A per 100 grams of diet, a very large excess. Beginning at six weeks of age, and for 36 days thereafter, both groups were given the basal diet used in the previous experiments. Their shanks were judged for degree of pigmentation, and two chicks from each group were sacrificed for determination of carotenoid and vitamin A in the livers. The analyses for the low vitamin A group showed 1.5 μg. of xanthophyll and 1,112 B.U. of vitamin A per gram of liver, and

the analyses for the high vitamin A group showed 1.4 μg. of xanthophyll and 5,406 B.U. of vitamin A.

The shanks were scored three times each week, and the average pigment scores for each group were plotted against time (Fig. 1). The chicks with the lower vitamin A stores soon began to accumulate yellow pigment in their shanks. The group with larger vitamin A stores accumulated pigment in their shanks at a considerably slower rate, indicating that the effect of vitamin A is exerted in the blood stream or tissues or both.

It has also been observed that large quantities of vitamin A in the diet or stored in the body of the hen have an inhibiting effect on the pigmentation of egg yolk.

The results of some preliminary work on the liver analyses of chicks fed high levels of vitamin A indicate that there is a simultaneous destruction of the carotenoid pigment and vitamin A. This phase of the study is being continued.


## Summary

These experiments show that the pigmentation-suppressing factor in fish-liver oils is vitamin A. Carotene fed at comparable levels does not exert a suppressing effect on pigmentation. Inhibition of pigmentation takes place when there is a sufficiently large bodily store of vitamin A; it is not exclusively an intestinal phenomenon.


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## The Effect of Tocopherols in Preventing Gastric Ulcers in Rats[1]


James L. Jensen[2]

*Research Laboratories, Distillation Products, Inc.*


Although the anomalies encountered in vitamin A bio-assay have troubled investigators for many years, it has not been generally recognized that rats which are deficient in vitamin A are nearly always afflicted with stomach ulcers. In this note it is reported that inclusion of extra vitamin E in the diet has completely prevented the occurrence of such ulcers.

The experiments which revealed this relationship were undertaken to find out whether alcohol affected the utilization of vitamin A by the rat. In addition to a vitamin A-deficient diet, one group of rats was given a minimal dose of vitamin A daily (.57 μg. and other groups, vitamin A plus either ethyl alcohol or vitamin E, as pure d,α-tocopherol, or both alcohol and vitamin E.

Table 1 shows the supplements given, the weight gains, and the percentage of rats having ulcers.

Severe gastric lesions were noticed upon autopsy of the vitamin A-deficient rats. The lesions, described as local circumscribed metaplasia of the surface epithelium,[3] were located in the fore-stomach and especially near the junction of the cardiac and pyloric portions. They ranged from pin-point size to craters 7 mm. in diameter, and some of them had been bleeding.

TABLE 1

Effect of Vitamin E, With and Without Alcohol, on Growth and Ulcer Production of Vitamin A-depleted Rats Receiving .57 μg. of Vitamin A Daily*

| Group No.‡ | Supplement† | | Gain in body weight after 48 days | Incidence of gastric ulcers |
|---|---|---|---|---|
| | Alcohol as 95% $C_2H_5OH$ | d,α-Tocopherol | | |
| | (mg.) | (mg.) | (grams) | (%) |
| 1 | 0 | 0 | 64 | 67 |
| 2 | 0 | 0.5 | 79 | 0 |
| 3 | 0 | 5.0 | 77 | 0 |
| 4 | 64 | 0 | 41 | 40 |
| 5 | 64 | 0.5 | 63 | 0 |
| 6 | 64 | 5.0 | 67 | 0 |
| 7 | 128 | 0 | 29 | 30 |
| 8 | 128 | 5.0 | 57 | 10 |

* The basal diet was fed ad libitum and contained: casein, vitamin-free, 18%; starch, 65%; salt mixture, U.S.P. XI, 4%; yeast, 8%; lard, 5%; vitamin D in the lard to furnish 30 units/10 grams of diet.

† In addition to .57 μg. vitamin A as a natural ester concentrate.

‡ The first group contained 15 rats; the others, 10 each.

Vitamin E fed to rats receiving minimal doses of vitamin A with and without alcohol supplementation protected the rats from ulcer formation, except those which were fed the larger dose of alcohol. Ulcers were present in many rats which did not receive the vitamin E supplement.

Since ulcers were prevalent among the vitamin A-deficient rats, and yet were nearly always absent when tocopherols were given, it may be tentatively assumed that the vitamin A-sparing action of the tocopherols was a factor in preventing the lesions. Alcohol, however, had an opposite effect on vitamin A utilization. The drop in weight gain from 64 to 29 grams (Groups 1 and 7) when comparing a diet without alcohol and one with alcohol may be used as a measure of the deleterious effect of alcohol on vitamin A. A larger tocopherol supplement for the group receiving the

[1] Communication No. 77.

[2] At present Post Nutrition Officer, Fort Knox, Kentucky.

[3] Dr. Karl E. Mason, University of Rochester School of Medicine, very kindly examined some of these lesions grossly and microscopically.

most alcohol might have lowered the incidence of gastric lesions.

Other workers have indicated a relation between vitamin A and ulcers. Fredericia, *et al.* (*1*) used a diet low in vitamin A and tocopherol and, after periods varying from 10 to 53 weeks, observed an 80-per cent incidence of gastric ulcers. In a similar group, which was fed the same diet with butterfat (containing vitamin A) instead of oxygenated lard, the incidence of ulcers was only 18 per cent. Vitamin A deficiency was therefore considered a principal factor in causing the ulcers, although other factors, as yet unnkown, may have played an important part. Pappenheimer and Larimore (*2*) found a 55-per cent ulcer formation in rats on a vitamin A-deficient diet.

If a vitamin A deficiency predisposes rats to ulcers, then a vitamin A-sparing substance such as tocopherol calls for further experimental work in their prevention. This function of vitamin E and also of other dietary factors is the subject of further studies to be reported later.

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## Identification of Small Amounts of Organic Compounds by Distribution Studies. IV: Use of a Solid Phase

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Countercurrent processes for fractionation such as fractional distillation, chromatographic adsorption, and liquid-liquid extraction are generally complicated processes which have been best described by rather involved mathematical treatment (*7*). With small-scale work, however, a considerable amount of simplification can be achieved, at least in liquid-liquid extraction, by the proper selection of conditions and by using a discontinuous process.

Previously reported studies (*3, 4*) have shown the advantages to be derived from the standpoint of quantitative investigation when transfers can be made in actual discrete units where an opportunity is offered to place all the material to be distributed in a single tube or unit at the start of the operation. This allows the whole process to be theoretically and precisely followed by means of the proper mathematical expansion when the substance involved does not show too great a shift of partition coefficient over the range of concentration used. Thus, for any pure substance the theoretical distribution may be calculated, and if experimentally a serious deviation is found for an unknown preparation of the substance, this would constitute good evidence for some degree of inhomogeneity. Moreover, this deduction can be checked readily by determining the partition coefficient of the material found in the tube where the greatest deviation from the theoretical occurs and comparing it with the value found for the pure substance.

This general procedure has proven particularly useful for studying homogeneity in basic compounds such as the synthetic antimalarials (*4*). In general, these substances do not give crystalline derivatives suitable for precise characterization by classical organic methods but do give highly specific partition coefficients in that they appear to offer wide differences even from those of closely related substances, when one of the phases is an aqueous phase in which the pH is held constant by means of a buffer (*2*). The same approach should also hold true for the characterization of acids (*6*), although somewhat more association in one of the phases might be expected with a resultant shift of partition coefficient with concentration.

In view of the similarity of countercurrent extraction and chromatographic principles (*5*), a further logical step to be taken in the development of the method of "Countercurrent Distribution" is the replacement of one of the liquid phases by a solid phase. This would bring into play the well-known specificity of the adsorption isotherm which is the basis for the striking separations often obtained with the chromatogram. Substitution of a solid phase for one of the liquid phases should not entail too great a change in the design of the countercurrent distribution machine in order to make its use practical. With this objective in mind a few simple experiments have been carried out preliminary to the expenditure of time and effort involved in the design of the more precise equipment required for a much larger number of transfers.

For simplicity in making the process directly analogous to the liquid-liquid type of distribution the degree of adsorption may be visualized in terms of a constant similar to that of a partition coefficient. This constant, A, may be defined as the percentage of the material found in the liquid divided by the percentage adsorbed by the solid which is in equilibrium with the liquid. Thus, if a known weight of a substance to be partitioned is used, $A = \frac{CV}{W-CV}$, where C = concentration of solute, V = volume of solvent, and W = total weight of solute taken.

Since equal volumes of the solvent and equal

weights of the solid phase are involved in each transfer, the constant, A, could be directly substituted for K in the mathematical treatment developed for the liquid-liquid type of distribution (*3*). The proportions of liquid and solid as well as the concentration of the solute could be chosen so that the constant, A, would show the smallest shift with change of concentration of the solute. The shift would naturally differ (*1*) with each system chosen as well as the solute to be studied and might be expected to be larger than in the case of most liquid partition coefficients.

In a few preliminary experiments with Brockmann's alumina (Merck) as the adsorbent, cyclohexane as the solvent, and chrysene as the solute, it was found that the constant, A, approximated 1.7 for 10 mg. of chrysene dissolved in 20 cc. of cyclohexane and equilibrated with 0.7 gram of alumina at room temperature. At a concentration of 2 mg. in 20 cc. of solvent, A approximated 1.3, and at a concentration of 0.2 mg. in 20 cc. it approximated 0.7. This is a shift which is not materially greater than those we have encountered in many of the liquid-liquid partition coefficients (*4*) without serious impairment of the method.

With these data at hand, an experiment was set up in which 11 tubes, numbered 0 to 10, were used. Seven-tenths gram of alumina was added to each of the first 10 tubes, but No. 10 was left empty. The alumina in each tube was treated with cyclohexane and the excess liquid poured off the top. Fifteen milligrams of chrysene dissolved in 20 cc. of cyclohexane (heated to cause solution and quickly cooled to room temperature) were introduced into the 0 tube. After two minutes of shaking for equilibration the solution was decanted into Tube 1. Twenty cubic centimeters of cyclohexane were then added to Tube 0 and both tubes equilibrated. The solution in Tube 1 was then decanted into Tube 2, while that of Tube 0 was transferred to Tube 1. Fresh solvent was added to Tube 0, and all three were shaken. This process was repeated progressively until all the tubes were filled. This completed the distribution.

A mixture of 2 cc. of methanol and 5 cc. of isopropyl ether was then added to each tube for complete elution of the adsorbed material, and the total amount of hydrocarbon in each tube was determined spectroscopically by means of the Beckmann quartz spectrophotometer. The weight found in each tube is shown graphically in Curve 1 of Fig. 1. This curve compares favorably with the type of curve encountered in liquid-liquid countercurrent distribution in which there has been a similar shift of K with concentration (*4*).

Anthracene was investigated in the same system and was found to have a coefficient, A, of approximately 7. Fifteen milligrams of this hydrocarbon distributed in exactly the same way as was chrysene gave the result shown in Curve 2. The maximum of both Curves 1 and 2 occurs at the positions on the graph calculated by the relationship of $N = n\left(\frac{A}{A+1}\right)$ given in the previous publication (*3*).

A mixture of 15 mg. of each hydrocarbon was next distributed. Though certain of the tubes contain

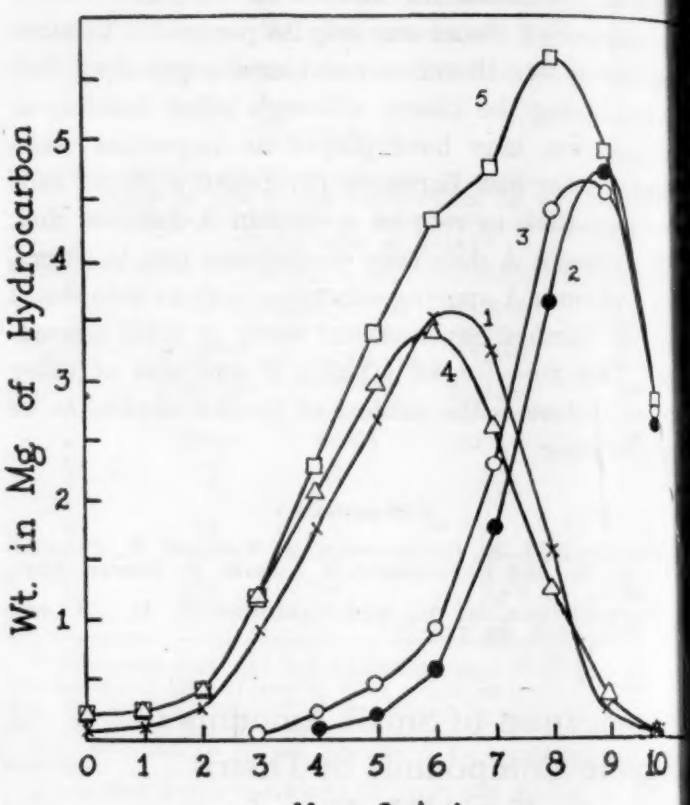


FIG. 1. × = curve for chrysene, ● = curve for anthracene, △ = curve for chrysene in mixture, ○ = curve for anthracene in mixture, □ = sum of curves for chrysene and anthracene in mixture.

mixtures in which a considerable portion of both hydrocarbons was present, the amount of each present in any one tube could be calculated from their respective extinction coefficients at those wavelengths for which the extinction of the one is relatively small in comparison to the other, and by appropriate subtraction. In this manner the distribution of anthracene was found to be that given in Curve 3, while that of chrysene was found to be that of Curve 4. Both showed a small deviation from that of the band obtained when the pure compound was distributed, but this might well be due to a slight tendency to associate.

The sum of the two curves gives Curve 5, which would be that to be expected had the analysis of each tube been done by evaporating to dryness and weighing the residue. The approximate percentage of each hydrocarbon in any one of the tubes can be calculated readily from the data, and the degree of separation in each tube is at once evident. Upon

ration to dryness Tube 4 gave 2 mg. of hydro- n which melted at the proper place for chrysene, Tube 10 gave 2.8 mg. of hydrocarbon which ed at the proper place for anthracene.

ese preliminary data would thus appear to show a solid phase can be substituted directly for one he liquid phases of "Countercurrent Distribu- " provided an adsorbent is chosen which has an rption isotherm within the proper range and of proper type. Certain advantages at once become ent in the procedure. Most of these have pre- ly been mentioned (*7*) and scarcely need to be re- ed here except as they relate to the customary matographic procedure.

would appear that the determination of the co- ient, A, may offer a rapid and convenient method selection of the most promising system from g the large number of possibilities.

econdly, the physical state of the adsorbent, such ze and shape of the particles, should be relatively portant in the procedure as outlined. With the matograph a certain size and uniformity is lly required in order that the packing may be homogeneous and at the same time yield the desired rate and uniformity of flow.

Just as in the case of the liquid-liquid type, the shape of the curve may give a suggestion at once as to the homogeneity of the preparation when a single substance predominates. If a mixture is present, it may suggest the number of components or give at least a hint in regard to whether or not further work with the particular system is advisable in order to obtain resolution of the mixture.

It would appear probable that the use of a solid with adsorptive properties in place of one of the liquid phases may greatly extend and widen the range of application of "Countercurrent Distribution." It is therefore our intention to make this approach part of our future study and to devise equipment suitable for achieving large numbers of transfers.

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# *Science Legislation*

## The Senate and S. 1850


**Howard A. Meyerhoff**

*Executive Secretary, AAAS, Washington, D.C.*


S ANNOUNCED IN THE 3 MAY ISSUE OF *Science*, the Council of the American Association for the Advancement of Science voted rwhelmingly to support the Kilgore-Magnuson bill ating a National Science Foundation. The final e is 230 to 10, which means that over 90 per cent the Council members voted. The problem now is convince the members of Congress that S. 1850 not ly meets the basic needs of science and scientists, but o will, if enacted, perform a public service of the st importance.

At the St. Louis meetings of the Executive Com- ittee and the Council of the Association, James B. nant, as president of AAAS, was asked to serve as e chairman of a special committee, empowered to e such steps as may be deemed desirable to assure ssage of the bill. The following men have been ked to serve as members of this committee: Detlev . Bronk, of the University of Pennsylvania; A. J. Carlson, of the University of Chicago; Magnus I. Gregersen, of the College of Physicians and Surgeons, Columbia University; Ernest O. Lawrence, of the University of California; Howard A. Meyerhoff, executive secretary of AAAS; E. C. Stakman, of the University of Minnesota; and Charles Allen Thomas, of the Monsanto Chemical Company, St. Louis.

The bill was placed upon the Senate calendar very quickly after it was reported out by the Committee on Military Affairs (*Science*, 1946, **103**, 382). However, it was passed over on 12 April, when it should logically have been discussed on the Senate floor. It is the hope of the bill's senatorial sponsors that it will come up for discussion during the week of 13 May. It is expected that action will have been taken on the extension of Selective Service by 10 May, and that the Senate will not be ready for the debate on the extension of OPA. In the week between the debates upon these controversial pieces of legislation, it is proposed

to turn to science, giving consideration to the Kilgore-Magnuson bill, the McMahon bill on Atomic Energy, and the Fulbright bill. Already the week of 13 May has been dubbed "Science Week" by the Senators.

To inform the members of the Senate how American scientists feel about S. 1850, Dr. Conant has composed a letter which has been sent to every Senator except those who have sponsored the bill. The letter tersely outlines the reasons why the National Science Foundation should be created, and the reasons are pertinent not only to Congressmen but also to scientists. For this reason the full text of the document is printed herewith:

Dear Senator

It is my understanding that Senate Bill 1850 creating a National Science Foundation is on the Senate Calendar, and I am writing on behalf of the American Association for the Advancement of Science to ask your support of this legislation.

Designed to promote the training of young scientists, to sponsor new fundamental research, to disseminate the results of research widely for the benefit of the public, and to restore national strength in scientific and technological fields, this bill is extremely important legislation, which scientists have endorsed by an overwhelming vote in the American Association for the Advancement of Science Council. The Association, in addition to its own 28,000 members, has 196 affiliated scientific societies with gross memberships in excess of 600,000. These affiliates have representation on the American Association Council which has just voted 228 to 10 in favor of S. 1850.

The Bill is non-partisan. It embodies carefully evolved compromises on such controversial questions as the administrative organization of the Foundation, the treatment of patents, the inclusion of the social sciences, and safeguards for scientific freedom. Not only the scientists, but the members of the Senate committees who have formulated the bill, have found a meeting ground in the sound and solid provisions comprising S. 1850; and these Senators, following consultation with government agencies that will be concerned in its operation, are satisfied that it is practical and will work. More than six months of research, analysis, and conference are embodied in the bill, and I am confident that you can accept it as a well considered piece of legislation which will greatly benefit the Nation.

In view of the importance of S. 1850, I venture to ask your support both in bringing the Bill to a vote and in voting for it, and I will appreciate your assurance that this support will be given.

Very sincerely yours,

JAMES B. CONANT, *President*
*Harvard University and*
*American Association for the*
*Advancement of Science*

Although the sponsors of the bill feel that the proposed legislation is sound and will command considerable respect and support in the upper chamber, they anticipate some opposition from a few of their colleagues. There are some who are opposed to the patent provisions of the bill, but it may be pointed out that S. 1850 contains no new patent legislation, although it does systematize patent policy within government bureaus and departments. It is difficult to see what legitimate or logical objection could be raised to systematization. There are others who are opposed to the inclusion of the social sciences but, as Senator Fulbright has aptly said, there is no field in which fundamental research is more urgently needed, and there is none in which greater return to the public welfare can be achieved. Even more serious is a widespread feeling that the creation of one more government agency calling for an initial appropriation of approximately $40–45,000,000, and an ultimate annual appropriation in excess of $100,000,000, would be a mistake. Such a feeling, if prevalent, ignores the significant tangible and intangible returns which the National Science Foundation will bring to our Nation.

Within the ranks of science most of the opposition for S. 1850 is professionally localized. From the outside the only known organized opposition comes from the National Association of Manufacturers. In the four-page release which the National Association of Manufacturers recently directed against S. 1850, it was not demonstrated that industrialists have an important stake in the creation of a National Science Foundation, and their gratuitous opposition to a carefully considered experiment designed to advance science must be branded as presumptuous. The relationships between science and industry are close and vital, but this fact does not give either group the prerogative to intervene in the affairs of the other. The National Association of Manufacturers has not been noted for its public relations policy, and it seems unfortunate that this organization should now attempt to obstruct legislation that has been painstakingly worked out with the collaboration of eminent scientists who have close ties with industry.

It is unnecessary to stress the fact that the week of 13 May may be an extremely critical period in the history of this proposed legislation. Favorable action in the Senate may make it possible to secure action in the House before the current session of Congress comes to an end. Unfavorable action will mean, at best, a delay of a year in the creation of a National Science Foundation. More ominously, it may mean the death of constructive science legislation.

# *Association Affairs*

## AAAS Buys Washington Building Site

### Scott Circle Property Assures Convenient Location

On Monday, 29 April, the Association closed with representatives of the owners of four separate parcels of ground, the whole comprising a wedge-shaped site on Scott Circle in Northwest Washington, for a future permanent headquarters building. It will be possible to enter the building from Scott Circle, Massachusetts Avenue, N Street, or Fifteenth Street.

The site was purchased with money collected for the purpose during the fall and winter. At the time of the purchase the building fund amounted to approximately $100,000, all of which, and more, was used for the land.

The location is convenient with respect to the Union Station, the National Airport, principal hotels, and other scientific and learned societies which maintain Washington offices.

The separate parcels comprising the site were each improved with buildings originally constructed as residences, but the largest, 1515 Massachusetts Avenue, has been used for business-office purposes for some years and will be available for Association use by 15 July. The other buildings will temporarily be continued as residence units, the income from which will accrue to the Association.

The principal building, shown in the figure below, contains four usable floors, totaling approximately 5,000 square feet of floor space, an amount sufficient for the immediate needs of the Association. No extensive remodeling is necessary.

It is planned to retain some space in the Smithsonian Institution until well into 1947, or even later, so that current operations will not come to a halt during a moving period.

*Photograph by courtesy Science Service*

**The photograph shows the Massachusetts Avenue entrance to the new home of the Association. It is expected that some of the Washington offices, including the offices of *Science* and the *Scientific Monthly*, will occupy space in this building at 1515 Massachusetts Avenue about 15 July. Ultimately this building will give way to a new nine-story structure designed and built to accommodate the rapidly extending functions of the Association.**

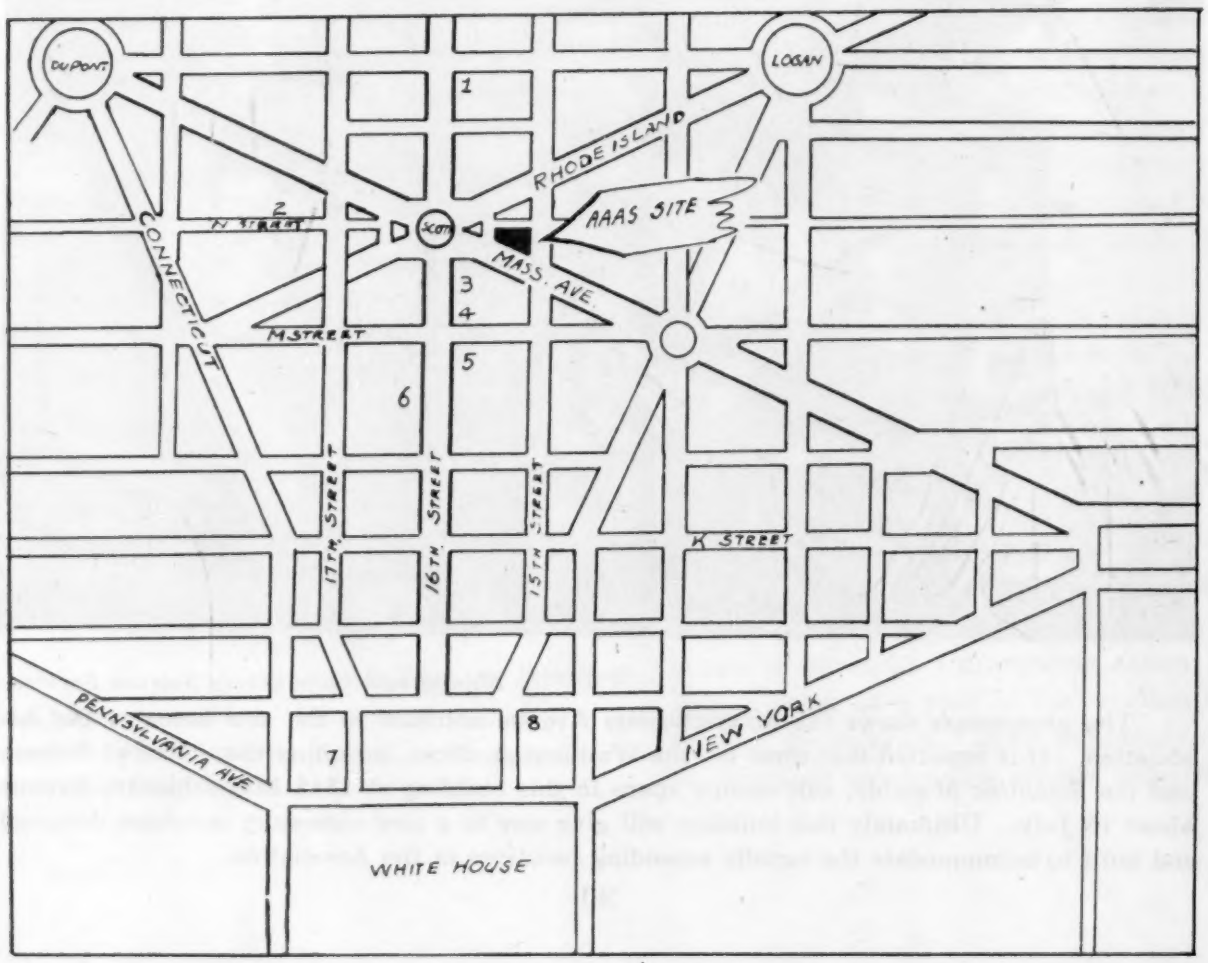
The city zoning area within which the new property falls is restricted to residences or offices, libraries, and laboratories of nonprofit associations and institutions. The area never will become commercial. The plot contains approximately 9,000 square feet of land, 90 per cent or 8,100 square feet of which may be used for building purposes, but the proposed building must not be over nine stories, so that a potential floor area of 72,900 square feet is possible.

The site was chosen by a subcommittee representing the Executive Committee. The subcommittee was appointed by A. J. Carlson, Executive Committee chairman, following extended discussion of the principles involved at St. Louis, and was composed of C. F. Kettering; F. R. Moulton, administrative secretary; Howard A. Meyerhoff, executive secretary; A. N. Richards, vice-president, University of Pennsylvania; Phillip Bard, Johns Hopkins; Warren Magee, counsel; and W. L. Valentine, editor of *Science*. After inspecting this and other property which was available, the subcommittee reported favorably on the Scott Circle plot at a meeting of the Executive Committee on Wednesday, 24 April. The Executive Committee accepted the report, inspected the property, and authorized purchase which was consummated five days later.

It is the consensus of opinion in the Executive Committee that the Association is really under way in providing itself with a permanent home. Now that the location is settled upon, it will be possible to make specific plans for the utilization of the land, and architects can be employed to put the needs of the Association into concrete plans for a functional building.

**This rough map shows the location of the newly acquired AAAS property with respect to some well-known Washington landmarks. Scott Circle is on the north and south axis of a reference point which includes the White House, the zero milestone, and the Jefferson Memorial (to the south of the area shown). Vermont Avenue and Connecticut Avenue, extended, intersect at a point in the center of the White House. From the zero milestone, due north through the White House along 16th Street, is exactly 4,500 feet. The property is roughly 200 feet east of the center of Scott Circle.**

**From the center of Scott Circle, along Massachusetts Avenue, to the boundary of the map is three-quarters of a mile; the Union Station is only one mile further on Massachusetts Avenue. The numbers on the map identify the approximate locations of the following well-known properties: 1, The Carnegie Institution of Washington; 2, Science Service; 3, American Council of Learned Societies; 4, National Education Association; 5, American Chemical Society; 6, Geographical Society of America; 7, Brookings Institutes; 8, Cosmos Club. The Statler Hotel and the Carlton, not included on the map, are at 16th and K Streets, five blocks from Scott Circle.**



# News and Notes

*R. Plato Schwartz,* associate professor of orthopedic surgery at the University of Rochester School of Medicine and Dentistry, left by plane on 30 April for England and Germany to study the problem of military footwear as scientific consultant to the U S. Army. He will return in June.

*F. R. Moulton was honored by a birthday party* given by the staff of the central office at the 2400 Club on the occasion of his 74th birthday, Monday, 29 April. Besides Dr. Moulton the guests of honor included two of his brothers, Harold G. Moulton, president of the Brookings Institutes, and Verne V. Moulton, president of Auto Owners Insurance Company. Also present were Dr. Barbara Moulton, a resident physician at the Suburban Hospital, Bethesda, Mrs. Harold G. Moulton, and Mrs. Verne V. Moulton. Dr. and Mrs. E. J. Stieglitz, close friends, were among the guests. During the evening Dr. Moulton revealed in a humorous vein the steps that led up to the acquisition of the Washington building site on Scott Circle.

*Walter N. Ezekiel,* recently stationed at the Naval Ordnance Laboratory, Silver Spring, Maryland, and previously plant pathologist at the Texas Agricultural Experiment Station, is now principal mycologist, Bureau of Ordnance, Navy Department, Washington 25, D. C.

*Wilfred J. Brogden* has been appointed visiting lecturer on psychology at Harvard University for the summer term of 1946. Prof. Brogden will offer a course in the psychology of learning and a seminar on the conditioned reflex.

*Melvin H. Knisely,* associate professor of anatomy at the University of Chicago, delivered the ninth annual Nobel Pierce Sherwood lectureship at the University of Kansas, Lawrence, on 29 March. His subject was: "Intravascular Agglutination of Blood in Disease."

*T. S. Lovering,* professor of economic geology, University of Michigan, delivered two lectures under the sponsorship of the William Harvey Emmons Fund to the advanced students of geology at the University of Minnesota on 8 and 10 April.

*Preston E. Cloud, Jr.,* now a member of the U. S. Geological Survey, has been appointed assistant professor of geology at Harvard University. On 1 July he will begin research and instruction in paleontology as successor to Dr. Percy E. Raymond, now emeritus professor of paleontology.

*Dr. Madge Thurlow Macklin* has joined the genetics group at the Ohio State University as senior research fellow of the National Research Council. She will work on the inheritance of human cancer.

*Dr. Clarence W. Clancy,* formerly on leave for service with the AAF as an aviation physiologist, has returned to his departmental duties with the rank of assistant professor of biology at the University of Oregon.

*Dr. K. A. G. Strand,* of the Sproul Observatory, Swarthmore College, has been appointed visiting associate professor at the University of Chicago beginning 1 October. Dr. Strand will be in charge of observational work in positional astronomy at the Yerkes Observatory and also at the McDonald Observatory of the University of Texas. He will be engaged primarily in photographic and visual observations of double stars.

*John T. Emlen,* now at The Johns Hopkins University, has been appointed associate professor of zoology at the University of Wisconsin. He will join the Wisconsin staff in September.

*Laurence H. Snyder,* of the Ohio State University, delivered the 21st Annual Herman M. Biggs Memorial Lecture before the New York Academy of Medicine on 4 April on the subject "Medical Genetics and Public Health."

*Dr. Harold Macy,* a dairy bacteriologist, was appointed associate director of the University of Minnesota Agricultural Experiment Station on 15 March. He first joined the staff in 1919 and in his new position succeeds Dr. Forrest R. Immer, whose death occurred recently.

*Dr. John R. Dick,* of Wheeling, West Virginia, has been appointed assistant professor of veterinary medicine at Ohio State University.

*Dr. Joseph W. Ferrebee* has been appointed assistant professor of medicine at the Harvard Medical School and Peter Bent Brigham Hospital where, in addition to his clinical teaching, he will head a program of research in fundamental aspects of the mechanism of hypersensitivity.

*Colin G. Fink,* professor of electrochemistry at Columbia University, was awarded honorary membership in the Electrochemical Society at the recent Birmingham Congress of the Society. Dr. Fink is a member of the AAAS Council and of the National Research Council, representing electrochemistry.

*John R. Murlin* has been honored by having the current volume (31) of *The Journal of Nutrition,* which covers the period January–June 1946, dedicated to him. According to his associates, Dr. Murlin, more than any other one person, has been responsible for the establishment of both the journal and its supporting professional society of research workers in the science of nutrition, the American Institute of Nutrition. Dr. Murlin served as the first editor of the journal, but gave up the responsibilities of his office in 1939, when he reached the age of 65 years and thus became an emeritus member of the American Institute of Nutrition.

In 1944, Dr. Murlin reached the age of 70 years and under normal conditions would have retired from his professorship at the University of Rochester. On account of the war and the shortage of personnel, however, he continued active for another year, and definitely retired in June 1945.

*George W. Kidder,* formerly assistant professor of biology at Brown University, has been appointed associate professor in the Department of Biology at Amherst College. His appointment was effective on 15 April 1946.

*Horace G. Richards,* associate curator of geology and paleontology at the Academy of Natural Sciences of Philadelphia, has received the "President's Award" from the American Association of Petroleum Geologists for his paper on "Subsurface stratigraphy of the Atlantic coastal plain between New Jersey and Georgia." The award was presented to Dr. Richards at the recent meeting of the Association at Chicago. During May, Dr. Richards will give the Distinguished Lecture Series on this subject before various geological societies in the country.

*John D. Kraus,* of the Radio Research Laboratory, Harvard University, has been appointed associate professor of electrical engineering at the Ohio State University.

*Lyle R. Dawson,* head of the Chemistry Department of the University of Kentucky, Lexington, addressed the Memphis Section of the American Chemical Society on 3 May. He said in part:

> The fissioning of atoms is no more astounding than the process of cell division which occurs in plants and animals. Perhaps it is actually much less complicated. The process is understood well enough to be quite easily controlled.
>
> Hence, when we speak of "controlling the atomic bomb," we realize full well that the fundamental problem is the control of the human element—particularly those tendencies which lead to bigotry, greed, selfishness, and the desire for power.

*Prof. Emilio Trabucchi,* from the Department Pharmacology of Modena, is continuing his resea activities. His laboratory survived the war and also in need of books and periodicals.

*Prof. Rabbeno,* former director of the Departme of Pharmacology in Genova, victim of racial perse tion, is being reintegrated in his official position. escaped deportation, like many other Jews in Ita due to the generous help which the Italian people ga to those persecuted.—*Nicholas Ercoli* (Warner Ins tute for Therapeutic Research).

## Announcements

*At the Seventh Annual Meeting of the Associati of Southeastern Biologists* in Columbia, South Car lina, 19–20 April, legislation concerning the creati of a National Science Foundation was discussed an the following resolution adopted:

WHEREAS, The members of the Association of Sout eastern Biologists subscribe fully to the principle that " full development of the nation's scientific and techni resources is essential for the national defense, nation prosperity, and the national health and welfare"; an

WHEREAS, The application of this principle is of u usual importance to the South; therefore,

RESOLVED, That this Association, through its Secretary urge all Congressmen representing this region to give the full support to the immediate passage of legislation pro viding for a National Science Foundation with adequat financial support.

RESOLVED, That the Association go on record as giving its general approval to the bill, S. 1850, now before Con gress and urge our Congressmen to give it their support

*The Department of State* is seeking the counsel of leaders in the fields covered by that Organization in order to enlist the widest possible discussion of the future program of UNESCO. In the field of natural science and technology, steps are under way to appoint a group of consultants. It is hoped that this group will be able to enlist the widest possible cooperation among the groups of scientists in the United States and among individuals and organizations engaged in related activities in the fields of scientific research and technological developments.

The group will advise the State Department in providing means for informing all interested scientific groups and individuals in the United States of the plans and programs of UNESCO and in securing ideas and suggestions from groups and individuals regarding the functions and activities of UNESCO.

The newly appointed group of consultants includes: Detlev Bronk, Howard Meyerhoff, W. Albert Noyes, Harlow Shapley, and Merle Tuve.

*A new degree, Doctor of Forestry,* will be offered Yale beginning in the fall of 1946, according to n George A. Garratt, Yale School of Forestry. this action, Yale will become the second university the Nation to offer work leading to this degree. the present time, Duke University is the only in- tution in the country which grants this degree.

Standards of performance for the newly-established gree will be essentially the same as for the Ph.D. he minimum requirements will be six full terms of aduate study and research, although some students ill require additional time. At least two consecutive rms of resident study must be carried on at Yale. ll students must possess a reading knowledge of rench and German before they are permitted to ndertake their second year of graduate study.

The D. For. degree is not intended to compete with, r serve as a substitute for, the Ph.D., since it is xpected that the student will continue to work in e Graduate School for the Ph.D. degree when his terests lie in such fields as forest economics, forest ils, forest ecology, and other subjects allied to the ndamental sciences.

The Yale School of Forestry, which is the oldest tablished forestry school in the United States with n unbroken history, currently has an enrollment of 5 students, the largest number registered since 1911.

*The National Registry of Rare Chemicals,* Armour Research Foundation, 35 West 33rd Street, Chicago 16, Illinois, has submitted their new needs in the following list of chemicals: cryogenine; 1,3-dinitro-acetone; thymoform; 3,5,8,10-tetramethoxy pyrene; pyrene carboxylic acid methyl ester; daphnetin; 1,8-diamino naphthalene; cis-stilbene; isocrotonic acid; thianaphthalene; 1,3-dihydroxy indane; 5,5′-dimethyl thioindigo; dihydroxy thiophenes; dihydroxy thiapyrans; acetylene urea; cerotic acid; melissic acid; p-aminophenyl selenoic acid; hydroxy aspartic acid; elaidyl alcohol; β,β′-dithiocyano diethyl ether. Please communicate regarding these directly with the Registry at the address given above.

*A new Division of Psychological Services* has been established within the Department of Psychology at the University of Pittsburgh. Wayne Dennis, head of the Psychology Department, has announced the appointment of William R. Grove as director of the new Division. To make possible the additional work of the Division, as well as to provide for the instruction of the increased number of students in psychology, four men have been added to the teaching and service staffs: Victor C. Raimy, Roger W. Russell, John Valentine, and Ralph E. Jenson. The Psychology Department now has a staff of 20 psychologists.

*The "tropical house," a source of mystery* to all who visited the University of Pennsylvania's botanical garden during the war, was built in one of the greenhouses there and is approximately 5 feet wide and 10 feet long. Constructed of concrete blocks, it is equipped with automatic controls which provide a daily cycle of temperature and relative humidity similar to that encountered in the rain forests of some of the Pacific areas.

According to Wesley G. Hutchinson, associate professor of botany at Pennsylvania in charge of the project, it was begun in the summer of 1942 under the Committee on Optical Instruments but was transferred later to the Tropical Deterioration Administration Committee.

Upon completion of the house, the floor was covered with a thick layer of tropical leaves from the greenhouses, and these were heavily inoculated with various types of tropical fungi and mites, which are known to spread the fungi.

Although it was impossible to reproduce in a house of this type the complex biological balance of a tropical rain forest, subsequent comparison of the rate of deterioration of materials in the house with that of the same materials exposed in the Panama jungle showed remarkable similarity.

The house, it was pointed out, was the first tropical chamber of its type to be employed in studies of tropical deterioration, although several others on the same general plan were constructed later at service laboratories.

In addition to using the "tropical house" on the Pennsylvania campus, Dr. Hutchinson made several trips to the Canal Zone and the Republic of Panama in 1943 and 1944 to study deterioration at first hand. As a result of these trips it was decided to establish a semipermanent laboratory in the tropics to extend the work being done at the University and to provide a place for testing materiel and methods of deterioration prevention under actual jungle conditions. The laboratory was set up on Barro Colorado Island in the Panama Canal Zone in the summer of 1944. Barro Colorado, which covers about six square miles, is an island in Gatun Lake, set aside as a biological preserve by Act of Congress.

At this jungle laboratory a program of testing and research was carried on, from June 1944 until the termination of the OSRD contract in October 1945, by Spencer H. Davis, Jr., and J. A. Jump, two former graduate students from the University, who were alternately in charge of the work on the island under Dr. Hutchinson's direction.

In addition to the testing of more than 14,000 individual items under jungle conditions for the armed forces, research there was closely correlated with problems under investigation at the University.

Development of a method to prevent the fouling of optical instruments by fungus growth is regarded by Dr. Hutchinson as probably the most important contribution made by the scientists on the project for the duration of the OSRD contract.

The problem was finally solved by the use of a small capsule containing Cresatin (meta cresyl acetate) in ethyl cellulose. This capsule was fastened in the instrument, out of the path of the light rays, and the fungicide volatilized within the instrument sufficiently to produce an atmosphere lethal to fungi. Instruments treated in this manner and stored in jungle positions were still clean after two years exposure, although untreated instruments may become fouled within three weeks.

*A dental specialists unit* to conduct postgraduate refresher courses in Holland has been organized by the School of Dentistry of the University of Pennsylvania, it has been announced by George W. McClelland, president of the University.

Designed to aid in restoring dental practice in Holland to its prewar level, the courses will be given in Amsterdam this summer for 200 Dutch dentists and 100 from other European countries, all of whom were prevented by the war from keeping abreast of modern developments in dentistry.

Instruction, beginning on 15 July and continuing for one month, will be in the fields of dental therapeutics, roentgenology, denture service, oral medicine, and diagnosis. Each course will be of two weeks duration and will be repeated once.

*Character and Personality,* the psychological quarterly edited by Karl Zener, of Duke University, has changed its title to *Journal of Personality.* The primary purpose of the journal is to serve as a coordinating medium of publication for original scientific investigations within all the major research areas concerned with personality. These would include, among others, studies of personality structure, its biological aspects, its expression in behavior dynamics, and its development and functioning in varied cultural contexts. A more complete statement of the editorial reorientation appears in the September issue, which first carried the new title. Emphasis will be placed on experimental and various other empirical types of research within the field, but relevant theoretical and methodological contributions will be included.

*The Gans Fund* has just made awards for scientific research to the following, it has been announced by Dr. B. R. Weimer, of Bethany College, West Virginia: William Montagna, Long Island College of Medicine; Esther L. McCandless, Cornell University; Helen Golden and Burton Kallman, Bethany College. T fund of $50,000 was established in 1939 by Wickel Campbell Gans to be used to assist undergraduates a graduates of the College in scientific research.

*The Central Examining Board of the Naval A Training Command,* located at Pensacola, Florida, w continue its standardized testing program for nav aviation training. The key examiner posts, held military personnel during the war, have been tra ferred to Civil Service. Lawrence Andrus, former assistant professor at the University of Chicago, h been appointed senior test development examiner a has as his assistant Raymond F. Monsalvatge, Jr. T Navigation representative on the board is E. Koestner, who previously filled this position in a mi tary capacity.

*The School of Dental and Oral Surgery* of the Fa ulty of Medicine, Columbia University, announces t establishment of a limited number of fellowships f graduates of dental schools. These fellowships w offer opportunity for study in the following bas science departments of the University: anatomy, ba teriology, biochemistry, pathology, pharmacology, an physiology. For further information regarding quali fications and stipends, address the Dean of the Facult of Medicine, Columbia University, 630 West 168 Street, New York City.

## Meetings

*The British Association* has found it impossible t arrange this year an annual meeting on the lines o the prewar meetings in provincial cities. A one-da meeting will therefore be held on 20 July in London The British Medical Association has granted the us of its hall for this occasion. The presidential addres will be delivered by Sir Richard Gregory. There wil be no sectional meetings. Opportunity will be take to receive delegates attending the Empire Scientific Conference organized by the Royal Society, and the Commonwealth Scientific Official Conference, at a luncheon on 20 July and at the subsequent meeting and also, it is hoped, at a Sunday afternoon reception at Down House, the home of Charles Darwin. It is also hoped to receive some of the foreign delegates who are expected to be in England at that time. It is intended to resume normal meetings in subsequent years, and an invitation has been accepted for the meeting in 1947 to be held in Dundee, where the meeting in 1939 was cut short by the imminence of war. An invitation from Brighton for 1948 has also been accepted.—*Nature, London.*

*The 46th General Meeting of the Society of American Bacteriologists* will open at 10:00 A.M. on Tuesday, 21 May, and will close at 5:00 P.M. on Friday, 24 May. All sessions will be held in the Book-Cadillac Hotel in Detroit, Michigan. Features of the meeting include the following addresses: "Immunologic Aspects of Protein Metabolism": Paul R. Cannon, University of Chicago; "Some Applications of Physical Methods of Bacteriology": Ralph W. G. Wyckoff, National Institute of Health. Round-table and symposia sessions have been organized for the following topics: (1) Early History of Bacteriology in Michigan, (2) A Discussion of Influenza, (3) Streptomycin, (4) Bacterial Taxonomy, (5) Microbiological Problems in the Processing and Spoilage of Foods, (6) Air Disinfection, and (7) Immunological and Physiological Activity of Factors Derived From Pathogens. The Committee on Teaching will sponsor a panel discussion on the general topic of "The Teaching of Bacteriology at the Graduate and Professional Levels." The president of the Society, James Craigie, of the University of Toronto, will deliver the banquet address: "The Significance and Applications of Bacteriophage in Bacteriological and Virus Research." The $1,000 award of the Eli Lilly Company will be presented to a young bacteriologist in recognition of research accomplishments.

Approximately 140 research reports from members of the Society will include discussions of the following topics: morphology and cytology of bacteria, disinfection and chemotherapy, viruses, antibiotic production and induced resistance of bacteria to antibiotic agents, sanitary bacteriology, physiology and metabolism of bacteria, and industrial processes. Post-convention trips have been arranged to include visits to the University of Michigan, Michigan State College, and the Bureau of Laboratories of the Michigan Department of Health. During the convention various alumni luncheons and other meetings have been scheduled.

Persons who are interested in bacteriology, in addition to members of the Society, are cordially invited to attend the scientific sessions and to visit the exhibits. Programs of the meeting may be obtained from the secretary-treasurer of the Society, Dr. L. S. Parr, George Washington University, 1335 H Street, N.W., Washington 5, D. C., or from the chairman of the Program Committee, Dr. L. S. McClung, Indiana University, 420 Kirkwood Hall, Bloomington, Indiana.

*The Cold Spring Harbor Symposium on Quantitative Biology* will be held 2–12 July and will deal with the topic, "Heredity and Variation in Microorganisms." Among the 26 participants in the program will be several from Europe. Attendance will be limited to 80. For program and information, address the Biological Laboratory, Cold Spring Harbor, New York.

*The Eastern Section of the Seismological Society of America* is holding its annual meeting at the Institute of Geophysical Technology of St. Louis University, St. Louis, Missouri, 14 through 16 June. Following the presentation of technical papers, a special symposium is proposed on the discussion of the problems involved in the establishment of new seismograph stations.

## Japanese Scientific Men

News of numerous scientific men in Japan and some of their publications are now reaching this country through U. S. Army and Navy officers and scientists who are going on missions to that country. More information has been received from the GHQ Natural Resources Section, of which Lt. Col. Hubert G. Schenck is the chief, than from any other source.

On 16 December 1945 there was a meeting of Japanese and American geologists at the Geological Institute, University of Tokyo. Of the American geologists, H. G. Schenck, T. A. Hendricks, Edward Sampson, H. S. Ladd, and F. C. Whitmore, Jr., contributed papers.

Thirty-five Japanese were present. Their names, with their specialties, are as follows: K. Asano (Foraminifera), B. Bessho (geology), Shoshiro Hanzawa (paleontology), Wataru Hashimoto (stratigraphy), S. Hori (economic geology), H. Huzimoto (geology and paleontology), H. Imai (economic geology), S. Iwao (petrology), Takeo Kato (economic geology), S. Kinshi (geography), Teiichi Kobayashi (historical geology, tectonics, stratigraphy, and paleontology), Jiro Makiyama (geology), Kosaburo Makino (mineralogy), Ichiji Mori (mining geology), Ryohei Morimoto (petrology), T. Nisiwaki (economic geology), Kei-iti Ohmori (petrology and mineralogy), T. Ohinomikado (Foraminifera), Y. Otuka (paleontology and stratigraphy), K. Sakakura (coal geology), K. Sawamura (petrology), S. Sekiguchi (interpreter), Ryuichi Sonobe (geology), T. Sudo (mineralogy), R. Sugiyama (petrology), Hisashi Suzuki (anthropology), Fumio Tada (geography), Fuyuji Takai (vertebrate paleontology), Jun-ichi Takahashi (economic geology), Seitaro Tsuboi (petrology), T. Tsujimura (physical geography and topography), Kunio Uwatoko (petroleum geology), T. Watanabe (economic geology), Hisakatsu Yabe (paleontology), and Shinji Yamane (geology).

Dr. H. Hattori, the director of the Imperial Biological Laboratory, on the Imperial Palace Grounds, and also director of the Tokugawa Biological Institute, both in Tokyo, is well and is still carrying on his scientific researches.

Prof. M. Matsuyama and Dr. N. Kumagai, of the University of Kyoto, are well and are continuing their gravimetric studies. Marquis Yoschichika Tokugawa, the founder of the Tokugawa Biological Institute which is devoted to botanical research, is well and active. His name has been in the papers with reference to a proposal made by him for curbing the political activities of the Emperor—a matter taken care of in the announced new constitution for Japan.

—*T. Wayland Vaughan* (Washington, D. C.).

# *Letters to the Editor*

## The Serodiagnosis of Amebiasis

Early studies on the serodiagnosis of amebiasis yielded inconclusive results. It was not until the work of C. F. Craig, demonstrating the occurrence of complement-fixing antibodies in the serum of subjects infected with *E. histolytica*, that the development of a satisfactory serologic procedure appeared possible (*Amer. J. trop. Med.*, 1927, 7, 225; 1928, 8, 29; 1929, 9, 277). However, the test possessed certain limitations, the major difficulty being experienced in the preparation of a uniformly reactive antigen. Recognizing this problem, C. W. Rees and his associates developed a technic for cultivating the specific organism in the presence of single bacterial symbionts; saline extracts of the cultures appeared more constant in antigenic activity, and a complement-fixation technic employing the new antigen was reported as yielding encouraging results in a preliminary study (*Amer. J. trop. Med.*, 1942, 22, 581).

Studies undertaken at this laboratory have been designed to determine the principles governing the optimal adjustment of reagents and conditions in complement-fixation tests. As a result, a quantitatively standardized technic based upon the use of the 50-per cent unit of complement has been developed for use in studies on the serodiagnosis of amebiasis. An experimental antigen prepared according to a modification of Rees's method has been supplied by the Hynson, Westcott, and Dunning Company of Baltimore, Maryland. The employment of a constant source of preserved sheep's blood (S. C. Bukantz and the writers, *J. lab. clin. Med.*, in press), and the adaptation of the spectrophotometer, with simple graphic methods, to the standardization of the hemolytic reaction (*J. Immunol.*, in press), have contributed accuracy and facility to the technic. A total volume of 1.0 ml. is used in tests, 0.2 ml. being allotted to each of the reagents. A 1:2 dilution of serum in salt solution is tested, alone and with antigen, in the presence of three 50-per cent units of complement. Four hours at 3–6° C. are allowed for fixation, and 30 minutes in the water bath at 37° C. for hemolysis. The foregoing conditions are advocated at present in order to avoid such nonspecific reactions as appear with the use of more dilute serum and extended periods of fixation.

Present indications are that the test provides a valuable laboratory adjunct in the diagnosis of amebiasis, particularly in cases in which failure to isolate the specific pathogen prevents the establishment of a definitive diagnosis. The details of the technic and the evaluation of its sensitivity and specificity will be the subject of a later communication.

In this work, the writers have had the technical assistance of Rebecca Goodman and Helen Conway.

JOHN F. KENT and CHARLES R. REIN
*Division of Serology, Army Medical School*
*Washington, D. C.*

## Biology in College and High School

The letter by Charles A. Gramet (*Science*, 1946, 103, 149) includes many provocative points, several of which I wanted to discuss. Space limits me to essentially one aspect.

In high school, as contrasted with chemistry and physics, biology holds an unfavorable position in local schools, being a nonrequired course, lacking laboratory periods, and being given to sophomores, about 15 years old. Also, as the course has become more "civic biology," a good trend for the high schoolers, it has become less a college preparatory course and still less an equivalent of a college biology course.

College offers a contrast. I do not refer merely to the plan of a year of college laboratory general biology. Large universities generally have separate botany and zoology departments. Each has an extensive year introductory course. Also, many medium-sized universities and colleges have to equal this setup. We give a year course in general zoology (8 credits) and a general botany course of similar length. Our majors must take both. Few other students take them.

My zoology has to be a thorough course with adequate systematic zoology included, as it must prepare for any or all of the advanced, junior and senior zoological courses, each usually a one-semester course, each crowded, without time for review of "general zoology," and each of which must essentially advance a student up to grad-

uate rank. The botanist has the same situation to meet. Of course, I believe that our 16 credits of university oology and botany, given usually to sophomores, four or more years older than high school sophomores, is vastly more than any high school biology course.

WALTER C. KRAATZ
*Biology Department, University of Akron, Akron, Ohio*

## Gift Packages Direct to Scientists in Europe

An active interest has been shown by Americans in sending parcels directly to families of the universities and scientific laboratories in the countries formerly occupied by the Axis. A check of the records kept by the secretary of the Committee listed below shows that 485 families have been referred since November to donors from coast to coast. An estimate of the parcels already sent indicates that they number about 650 (three tons). In Holland alone some 300 families have been assigned to American families, and an estimated 450 to 500 parcels have been sent. A number of interesting and appreciative letters acknowledging receipt of the earlier parcels have been received.

The Committee has in its files 125 families in six countries (Holland, France, Belgium, Czechoslovakia, Norway, and Greece) that have not yet been assigned to anyone and about 150 others to whom many additional articles should be sent. The need for clothes (especially warm ones and shoes), bedding, notions, and food is still very great and will probably remain so through next winter.

If you can send a parcel to a professional colleague, you may obtain a name from the secretary of this Committee. The majority of the families now listed with the Committee are from Holland. Direct correspondence with these Dutch families has resulted in specific information regarding the needs of each family and the sizes of persons in the family. The information on hand for other countries is, in general, not yet so complete. In many cases it may not be possible to send all of the items mentioned by the family assigned to you, but it should be remembered that partial fulfillment of these needs is much better than no package at all. Although the things you have to send may not fit exactly the family assigned to you, our experience shows that these people are not reluctant to help their friends or neighbors by passing on any articles they themselves cannot use.

*Committee members*: Langhorne H. Brickwedde, Louise McD. Browne, Emilie H. Condon, Lola S. Deming, Alma R. Hamer, Mildred R. Masi, Grace H. Ruark, and Grace H. Smith.

GRACE H. SMITH, *Secretary*
*National Bureau of Standards, Washington, D. C.*

## Histochemical Localization of Adenosinetriphosphatase

In *Science* (1946, 103, 144), Moog and Steinbach pointed out certain limitations of the method presented in a paper by Glick and Fischer (*Science*, 1945, 102, 429–430), entitled "The histochemical localization of adenosinetriphosphatase in plant and animal tissues." Since the method depends on the visualization of phosphate liberated enzymatically from adenosinetriphosphate (ATP), it will, of course, demonstrate the presence of any phosphatase that can act on this substrate and, in addition, any phosphatase, if also present, that can act on the products of the scission. The specificity of these enzymes, and hence the best nomenclature, has not been completely clarified as yet. However, the impression should not be given that the method in question does not have its field of application.

As Moog and Steinbach pointed out, the method will detect ATPase separate from any other phosphatase that can act on ATP when they have different cellular distributions, or when only, or predominately, the ATPase is present. The latter is the case in certain instances. For example, Glick and C. C. Lushbaugh (unpublished observations from the University of Chicago Toxicity Laboratory and Department of Pathology) found that the muscle and ganglia of the cockroach (*Periplaneta americana*) gave a positive reaction in the histochemical test with ATP and a negative reaction with glycerophosphate under the same conditions. K. P. DuBois and V. R. Potter (*J. biol. Chem.*, 1943, 150, 185) observed that rat liver contained appreciable ATPase but had a negligible action on glycerophosphate; this work was carried out at pH 7.4, however. It might be possible to increase the field of usefulness of the method by exploiting differences in properties between ATPase and phosphomonoesterase, such as the difference in activation of the enzymes given by calcium and magnesium (DuBois and Potter).

Moog and Steinbach also emphasized the lability of ATPase in some tissues. Naturally, if the ATPase in a given tissue cannot stand the rigors involved in the preparation of paraffin sections, it would be necessary to use frozen sections and even perhaps frozen sections of unfixed tissue. That ATPase may be present in paraffin sections was indicated by the positive results obtained with cockroach tissues (Glick and Lushbaugh). The length of time required to develop a positive reaction is not critical, however, as it is well known that considerable enzyme losses can occur during histological preparation. This does not impair the validity of the qualitative histochemical test, since loss of enzyme may be compensated by employing longer digestion periods.

DAVID GLICK
*Russell-Miller Milling Company, Minneapolis*

## Sources of Future Scientists

This letter is stimulated by the letter on the above subject by Clarence J. Gamble, M.D. (*Science*, 1946, 103, 457).

While undoubtedly it would be desirable for future scientists to be recruited as largely as possible from the descendants of other scientists, I do not think that it can be shown at any time in the history of civilization that scientists have been recruited chiefly from such stock. It is even true that in other fields of activity they usually have not left families containing nearly as many children as those from the population to which their fathers belonged. Is it not generally true that, in any population, those who have devoted a major portion of their time

during youth to acquiring special knowledge or skill in any line have had smaller families than those who have devoted less of their time in special preparation?

At the present time if a young man devotes his energies exclusively to preparation for future work until he has acquired a Doctor's degree from some institution of learning, he is not very likely to have reached that stage earlier than 25 years of age, and if he has been obliged to support himself or any others during that period, he cannot have become a specialist of note until a considerably greater age has been reached. This necessarily means that people who devote their time tc preparation are not able to assume the responsibility of raising families of children. If such a man marries a woman approximately his own age, it is not at all likely that they will raise more than two or at most three children to maturity, and if any children are born to them who do not survive, the percentage must necessarily be somewhere about what is recorded in the report of Dr. Bush.

Obviously it is because the population at large, including those individuals who do not devote the major portion of their youth to special preparation, is able because of economic conditions to raise larger numbers of children to maturity, and to give them the proper heredity factors to enable some to become scientists and to provide the means for supporting them during the educational period, that the number of trained scientific people not only has been maintained but has been increased very greatly during the memory of the older persons now living. Admittedly, there are disadvantages to the postponement of the assumption of family duties which not only reduce the number of people able to acquire special training but also cause many who would like to acquire proficiency as scientific workers to fall by the wayside. It does not seem possible to recruit research workers chiefly from the descendants of other scientific research workers unless the means of support during the educational period is subsidized to such an extent as to permit students to assume family obligations of their own choosing. It is doubtful whether such a course would advance science materially, and it is not at all likely to be adopted by democratic communities.

WM. MAYO VENABLE

*Blaw-Knox Company, Pittsburgh*

## Anent "Blood Relationship"

The struggle to shape a proper terminology for use in social science is unending, and the difficulties to be surmounted rear greater obstacles than those confronting the physical scientist. Creation of a new terminology for a newly discovered phenomenon is a relatively easy matter for the physical scientist, who is penetrating new fields where no preconceived terminology has run ahead of him. He creates neologisms, usually from Latin or Greek roots, and more often than not with linguistically fantastic results. By those means he shapes a semantic tool that has a clear and sharp meaning for himself and his professional colleagues, and he little cares how it tortures the tongue of the layman or whether it has meaning to the uninitiate. Happily for the physical scientist, this merely increases his prestige and further awes the layman.

It is otherwise in the lot of the social scientist. His terminological struggles result from the attempt to bring clarity and precision into the language of human relationships—a body of phenomena with which men have been familiar for quite some period of time, if not scientifically informed thereon. Therefore, the layman looks with suspicion and sometimes with hostility toward the social scientist, who uses new terms to deal with what he, the layman, thinks are old and familiar facts. There must be something subversive in a movement that cloaks the "commonplace" in ununderstandable language. In this the layman is right, but not in the way he thinks he is. The purpose of the social scientist is to destroy the inaccuracies of thought which underlie inadequate popular conceptions in the field of social relations.

When the social scientist introduces a new term for an old, familiar, popular label, he does so because the popular term carries such a freight of error and cluttering emotional baggage that it is beyond easy salvage and should best be scuttled. "The meaning of a word lies in the action it produces."

During the recent war the American Red Cross felt it was necessary to segregate negro blood from white in "blood bank" collections and the processing of plasma. This was done, even though the Red Cross was itself aware of the fact that racial traits are carried in the germ plasm and not in the blood. It felt compelled to do so because of the popular belief that hereditary traits are "in the blood." This action of the Red Cross, as we all know, involved it in a tempest of controversy, aligned it with a false and undemocratic position, and created additional work in the extra handling and classification of negro blood and plasma. Fortunately, when it came to saving lives through the use of the plasma, the Army medical corpsmen (or at least some units of them in some areas of action) ignored the racial classifications which the Red Cross had so painstakingly maintained. They paid attention only to the blood-type classifications, thus limiting their selectivity to the needs of scientific fact and properly ignoring the consequences of popular error.

We scientists are in no position to criticize the action of the Red Cross, since we have consistently contributed to popular misconception and are continuing to do so at this very moment.

Like any thoughtless person, we speak of "blood relationship." Anthropologists, of all scientists, are most guilty! In all our discussions of kinship (a subject of consuming interest to anthropologists) we regularly use the term "blood relationship group." The terms "consanguine family," "consanguinity," "consanguine relatives," are all in constant use along with the synonym, "blood relatives." It is not necessary to cite cases. One can pick up any current book or monograph in

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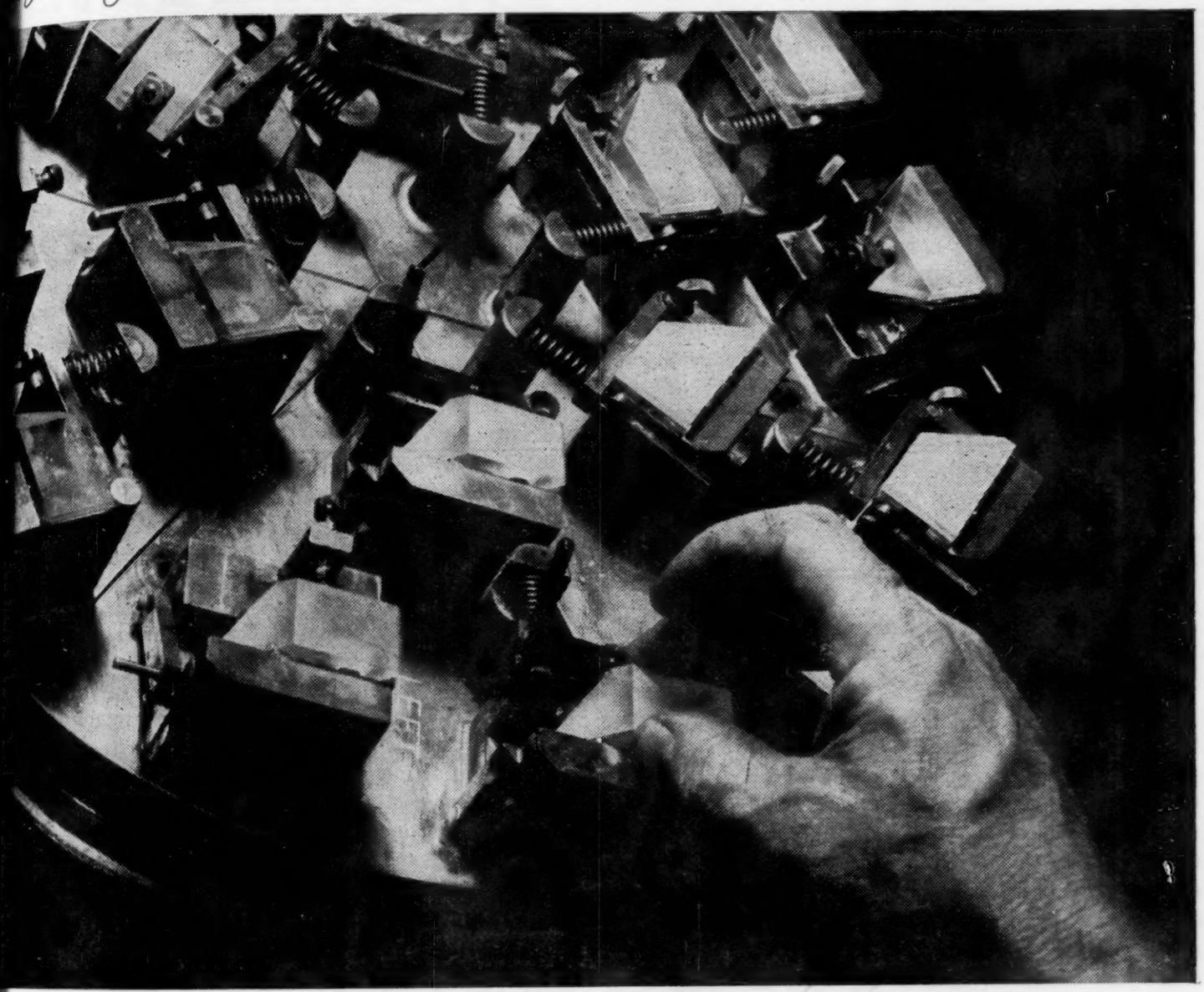

# A Diamond *and* the Rough

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ethnology, or any issue of *The American Anthropologist*, and he is likely to find sufficient instances without painstaking research.

But a moment's reflection shows us how ridiculous and false this terminology is. The clan, for instance, is not founded on any blood tie, nor is any other relationship of family or kin. The relationship may be genuine or fictive, but it rests on a *genetic* principle and nothing else.

The error is even more agregious in physical anthropology when we commonly speak of racial ancestry in terms of blood. It is not unusual, for example, to hear a contemporary anthropologist say that the composite Polynesian race is predominantly Caucasian with a definite Mongolian admixture and a minority element of Negro *blood*. We still speak of half-blood and full-blood Indians.

The error of the anthropologist is shared by his fellow scientists. We unthinkingly carry and perpetu the timeworn popular fallacy of hereditary continu through blood. *In the interests of scientific accuracy is incumbent upon us to stop it.* The imprint of accura word usage based upon scientific fact must be stamp upon the lexicon of all men by scientists. It is o responsibility not to permit ourselves to be bound popular word usage based on age-old error, especial when the error serves to generate and perpetuate unt mischief in the affairs of men.

A simple correction can easily be made. For "blo relationship" and "consanguine" substitute "genet relationship" and "genetic group." For Negro, Ca casian, and Mongolian "blood" substitute "ancestry or "hereditary of genetic component" unless it is blo you are talking about and not racial heredity.

E. ADAMSON HOEBEL

*New York University, Washington Square, New York*

# Book Reviews

***Animal cytology and evolution.*** M. J. D. White. London: Cambridge Univ. Press, 1945. Pp. viii + 375. (Illustrated.) $7.50.

This timely and, in many respects, excellent review of the present status of chromosome morphology in relation to genetics hides its subject nature under a misleading title. The author may have intended originally to write a general cytology text; but he narrows the scope of the book in the Introduction, announcing that "by cytology we mean nuclear cytology, since the evolution of cytoplasmic constituents of the cell is an entirely different subject." In fact, even the term nuclear cytology seems too inclusive, considering that the book deals almost entirely with the chromosomes as the carriers of heredity. The comparative lack of purely cytological interest is reflected in the illustrations of the book, which consist of diagrams and simple line drawings.

The author makes a deliberate effort to relate his material with "neo-Darwinian" views, but in many instances, these attempts are unconvincing. By excluding from discussion all protozoans, plants, and lower organismic forms, the largest source of material which might serve as a basis for phylogenetic speculations remains unused. Consequently, the chapter on "The Evolution of Meiosis and the Chromosome Cycle" does not deal with the origin but merely with some modifications of meiosis, mostly as observed in aberrant insect groups. One may justly apply to this and other chapters of the book the commentary which the author attaches to his review of Goldschmidt's Lymantria work: "Its significance from the evolutionary point of view is, however, by no means clear."

The chapter on "The Evolution of the Sex-determining Mechanism" probably comes closest to the pr claimed aim of the book. The obvious fact that sever times within the animal kingdom the change from he maphroditism to gonochorism is followed by an evoluti of sex chromosome mechanisms provides a tempting fie for theory and speculation. White follows tradition ways in suggesting that sex-determining mechanism evolve from monogenic differences (at a single chrom some locus), expand through the acquisition of differe tial regions, and finally become visible under the micr scope in the shapes of X and Y chromosomes. He offe an excellent discussion of the relationships betwee pairing segments and differential segments of the se chromosomes and their bearing on chiasma formation crossing-over frequency, and reductional or equationa distribution of the sex-chromatin in the first meiotic division. The scarcity or absence of sex-linked mutant in many of the more advanced-type sex chromosomes i connected interestingly with the progress of heteropy nosis. Gradually, the chromosomes seem to lose all orig nal genetic functions except for their role in sex dete mination. The concluding paragraphs of the book contain the surprising statement that "monogenic sex determining mechanisms which we observe at the present day, were almost certainly evolved as reversions. . . . Accordingly, amphibians and teleosts should no longer b considered as links between the primitive hermaphrodit and the advanced sex chromosome types. But such a conclusion receives little support from recent investiga tions which reveal that, among lower vertebrates, rudi mentary hermaphroditism is a relatively frequent occur rence and genetical sex determination is usually in a very labile condition. Furthermore, comparative chro mosome studies furnish no indication that, once present

ll-developed sex chromosomes were "subsequently ."

The book serves as a comprehensive guide to the chro-some literature bearing on genetical matters. Entire apters are devoted to such fundamental subjects as ucture of mitotic chromosomes, salivary-gland chromo-es, structural rearrangements and meiosis; others r on special problems connected with parthenogenesis, e haploidy, and hybrid sterility. The always inter-ing subject matter is presented in stimulating and ily readable form. In a second printing, some minor rors and inconsistencies should be eliminated.

EMIL WITSCHI

*tate University of Iowa*

*Modern plastics.* **Harry Barron. New York: Wiley, London: Chapman and Hall, 1945. Pp. xv + 680. (Illustrated.) $7.50.**

This book, as the author notes in his Preface, has been ritten for the reader with a modest scientific or engi-ering background who wishes to obtain an over-all view the plastic industry. In line with this thought, the ok covers all the well-known basic plastics, emphasizing eir requisite raw materials, manufacture, processing, d applications. The nine chapters on phenolic plastics ver the phenol formaldehydes, the urea formaldehydes, d the melamine formaldehydes. Special emphasis is aced on the methods of polymerizing and details of olding, casting, and laminating. The five chapters on llulose plastics are concerned with cellulose nitrate, llulose acetate, and ethyl cellulose. Of particular inter-t is the description of the injection molding process. e vinyl resins are well covered, with much attention ing given to applications. Brief but excellent chapters plasticizers and the extrusion process are included. olyamide plastics, alkyd plastics, and casein plastics are ch discussed. High-frequency heating methods, analyt-al tests, and physical tests are briefly considered.

While the book has not been written for the specialist plastics polymerization, there are several very good escriptions of the polymerization process both for ermoplastic and thermosetting materials. The author ceeds very well in presenting an over-all picture of lastics chemistry and plastics technology. Although the uthor is an Englishman, most of the references are to merican concerns and literature. However, enough of ermany's and England's contributions are present to ive the book a cosmopolitan flavor.

The author makes no pretense of including any up-to-e-minute developments, and such topics as allyl plastics nd silica plastics are absent. The newer developments alkyds and low-pressure laminating are not treated dequately in the light of present knowledge. For Amer-an readers, the author's dependence on British testing rocedures is unfortunate.

All in all, however, the book can be well recommended s covering the entire field in an adequate manner.

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# Catalogue Corner

**Please write directly to the company indicated for any publication you wish mentioning the bulletin number and *Science*. Publications are gratis unless otherwise noted.**

*Darkfield Quebec colony counter.* A new, improved design of the Spencer Darkfield Quebec Colony Counter is now available. The front surface is inclined at an angle found to be most convenient to the average technician. An auxiliary tilting base can, however, be supplied when there is an individual preference for further adjustment. The scientifically designed reflector provides illumination, free from glare, uniform over the entire field, and adequately bright to reveal and distinguish small colonies from other structures. Emphasis has been laid on correct illumination to facilitate counting and to reduce fatigue. The 4½-inch lens, mounted on a sliding rod for focusing purposes, has the standard 1.5X magnification specified by the American Public Health Association. It is so positioned that errors from parallax are avoided. If required, additional magnifications can be provided by the addition of an auxiliary lens. When not in use, the lens and mount may be pushed down and out of the way. Wolffhiegel, Steward, and Jeffers guide plates are available. Centering screws are provided so that a Petri dish may be positioned when circular ruled plates are used. *Brochure M–84 246 SC–51.* American Optical Company, Scientific Instrument Division, Buffalo, N. Y.

*New portable stroboscope.* Model 1210, the newly developed stroboscope of Communication Measurements Laboratory, employs a novel circuit arrangement, using a self-blocking oscillator. Rotary or vibratory motion can be "stopped" when the moving object is examined with stroboscopic light source. The speed covered is from 600 to 48,000 r.p.m. (10–800 cycles per second), in four ranges. A synchronized reed is provided for accurate calibration against the line frequency. All four scales can easily and quickly be calibrated within – 3 per cent.

The light source is contained in a probe attached to a four-foot flexible cable. This feature makes CML 1210 useful when using the stroboscopic light in small out-of-the-way places. The light probe and cable are housed in the cabinet when the stroboscope is not in use. CML 1210 weighs only 19½ pounds and is housed in a compact cabinet, $10\frac{1}{2} \times 5\frac{3}{8} \times 10\frac{1}{2}$ inches. *Descriptive Bulletin SC–51* may be obtained from Communication Measurements Laboratory, 120 Greenwich Street, New York 6, N. Y.

*Resistance measuring instrument.* A four-page bulletin has just been issued by James G. Biddle Company, describing three different types of their "Megger" instruments for measuring low resistance. These include the "Bridge-Meg" Resistance Tester—a combination Wheatstone Bridge and "Megger" Insulation Tester; the "Ducter" Low Resistance Ohmmeter, which operates by pointer deflection down to .000001 ohm; and the Midget "Megger" Circuit Testing Ohmmeter, which reads from a fraction of an ohm up to 200,000 ohms. Described in *Bulletin 1805 SC–51.* James G. Biddle Company, Philadelphia, Pa.

*Sex endocrinology.* The Schering Corporation has published an interesting and authoritative 88-page booklet on the history, chemistry, physiology, and therapeutic use of the important hormones in modern medicine. It is profusely illustrated with informative diagrams and actual case photographs. The complexities of endocrinology are clarified, and the subject becomes readily understandable. *Sex endocrinology, Booklet SC–51.* Schering Corporation, Bloomfield, N. J.

*Experimental dehydration unit.* National Research Corporation is now manufacturing a small dehydration unit, Type 3501, for use in the laboratory or in pilot production. This unit is a complete unit for the desiccation or concentration of heat-sensitive biologicals, antibiotics, food products, and fine chemicals. The pumping system consists of a two-inch oil diffusion pump backed by a 12.5 c.f.m. mechanical pump, which is also used for roughing. Time required to pump down to 200 microns of Hg from atmospheric pressure is four minutes, and the blank-off is 1 micron or less. Water vapor is handled by a carbon dioxide and acetone (or alcohol) cold trap with a capacity of four pounds of ice. Three thermocouple gauges, at the fore pump, diffusion pump, and cabinet, indicate vacuum conditions. Provision for four thermocouples in the cabinet permits control of heat input. All controls and gauges are located on a central control panel.

The drying cabinet measures $16 \times 16 \times 24$ inches, and it is possible to connect larger containers to the system by means of four outside nipples. The cabinet is equipped with three adjustable shelves electrically heated with a controllable input of 1 kw. For complete details request *Release 3501 SC–51.* National Research Corporation, Boston 15, Mass.

*Miniature thyratron.* A new miniature thyratron measuring only 2⅛ inches and mounted in a T–5½ bulb, suitable for many electronic control applications where equipment must be compact, portable, or light-weight, has been announced by Sylvania Electric Products, Inc., Radio Tube Division. The tube may be operated in any position and is not affected by ambient temperature. Typical ratings and characteristics of the type 6D4 miniature thyratron are as follows: heater voltage, a–c or d–c, 6.3 volts; heater current, 250 milliamperes; maximum voltage between elements, 450 volts; heating time, 30 seconds; maximum peak anode current, 100 milliamperes; maximum heater-cathode, voltage, – 100 volts, + 25 volts. Write for *Information Sheet SC–51.* Electronics Division, Sylvania Electric Products, Inc., 500 Fifth Avenue, New York 18, N. Y.